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THE COMMERCIAL CAR JOURNAL

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa.

THE CITY OF DETROIT OPERATES NINETEEN PACKARD VEHICLES

DETROIT knows motor vehicles as Sheffield knows steel. Several branches of municipal service in Detroit have standardized their equipment with Packard vehicles.

The Park and Boulevard Department operates seven 3-ton Packard trucks, equipped with passenger bodies of the passenger type, on the famous Belle Isle park.

The Public Works Department operates two 6-ton Packards for the collection of garbage in the daytime and for

night. In winter these trucks are equipped with "snow snoots" and used as plows.

The Public Lighting Commission operates a 2-ton Packard equipped with a power winch.

The Police Department has replaced horse-drawn wagons with seven Packard motor carriage chassis equipped as motor patrols.

The Fire Department operates two Packard motor carriage chassis with special bodies as "flying squadrons."

Twenty-two cities have Packard trucks in daily municipal service.



ASK THE MAN WHO OWNS ONE
PACKARD MOTOR CAR COMPANY, DETROIT

LICENSED UNDER KARDO PATENTS

LINCOLN HIGHWAY CONTRIBUTOR



PUBLISHED THE
15TH OF EACH MONTH

CHILTON COMPANY

MARKET & 49TH STS.
PHILADELPHIA



The BRAKES BELONG *on the* WHEELS-NOT *on the* JACK-SHAFT

Sheldon Double-Brakes-On-The-Rear-Wheels

Has sounded the death-knell of the jackshaft method of braking. It spells finality as to the location of the brakes because it puts them in the only logically correct position—ON THE WHEELS.

SHELDON EQUIPMENT gives you two sets of brakes on the rear wheels. There is always certainty as to the braking efficiency—which is not true of jackshaft brakes. Suppose with your present method, the chains should “jump off” at the critical moment? Could you depend on your single set of rear wheel brakes skidding the wheels?

Take our 3-ton equipment as an efficient example. The outside brake is of the wrap-up type acting on the 18-in. by 3-in. pressed steel drum. The inside brake is of the self-intensifying type. Either brake will skid the wheels. You can take your choice of foot or hand brake. There is a braking surface of 500 square inches. To stop a 3-ton truck with 50 per cent overload means applying only 200 pounds pressure per square inch to the braking surfaces. On many trucks the pressure runs as high as 700 pounds per square inch. The self-intensifying feature of Sheldon Brakes gives a uniform pressure on the whole surface of the drum. This is not the case with any other type of brake.

Can you wonder that ordinary brakes fail to hold at the critical moment?

IN A YEAR OR TWO EVERY HIGH-GRADE TRUCK WILL BE EQUIPPED WITH BRAKES ON THE REAR WHEELS. JACKSHAFT BRAKES ARE ALREADY DOOMED! THE LEADING TRUCKS ARE COMING TO DOUBLE-BRAKE REAR WHEEL EQUIPMENT.

Why not make your truck one of the leaders? It'll be a selling point in your favor.

Write us for information on this subject—today.

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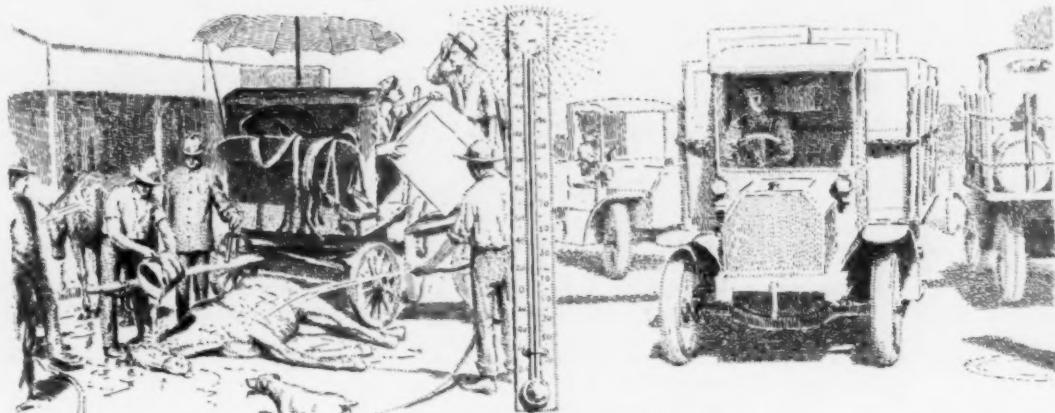
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1215 Woodward Avenue

THE PUBLISHERS' PERSONAL PAGE

*Defer not till to-morrow to be wise;
To-morrow's sun thy horses may demise*

Each year during July and August, an almost inconceivable sum is lost in horseflesh, due to the hot weather.

Speaking of horse mortality,---in July, 1908, in the city of New York alone, 791 horses died of heat, in two weeks, and in August, 906 died; during the same time, in Chicago the mortality rose to 1900.



ARE YOU PREPARED?

It is difficult to realize that \$10,000,000 worth of horseflesh could be lost in practically one month, due to hot weather alone, and this is merely the money loss. Such horse failures cannot take place without great detriment to any business.

When the thermometer goes up, horses go down, many of them never to rise again, but even if they do, their efficiency is permanently impaired. There is no parallel in the use of trucks aside from being struck by a railroad train, or burning of the vehicle, both of which are always the result of carelessness.

Are you prepared for the torrid period?

History
Repeats Itself

Horse
Mortality

\$10,000,000
Lost in One
Month

No Parallel
With Trucks

Why Not Become Informed

THE AUTOCAR IN THE SERVICE OF
Department and Dry Goods Stores

Types of Autocars Operated by Department and Dry Goods Stores

About The Best Way
To Deliver The Goods

Your Delivery Problems Solved

Read how it has been done by merchants in every line of business.

It costs you nothing to be informed about the practical and economical way to deliver all classes of merchandise, and this knowledge means bigger business and a daily saving.

The new 64 page AUTOCAR Book is full of useful Motor Delivery information. We will send you this book free of charge, and we know it will prove interesting. It's a business book about a business getter, for every business concern.

ADDRESS DEPARTMENT J
Ask for the new AUTOCAR Business Book

THE AUTOCAR COMPANY, ARDMORE, PA.
ESTABLISHED 1897
MOTOR DELIVERY CAR SPECIALISTS

The Commercial Car Journal

VOLUME VII

PHILADELPHIA, JUNE 15, 1914

NUMBER 4

MOTOR TRUCK ASSOCIATION OF PHILADELPHIA DINNER

The newly organized Motor Truck Association of Philadelphia, enjoyed a dinner recently at which approximately one hundred members, representing practically all the concerns in the truck business in Philadelphia and vicinity, were present.

At the head table were seated E. B. Jackson, president of the association, who also acted as toastmaster, and the other officials, Emlen S. Hare, vice-president, J. W. Howley, treasurer, and W. H. Metcalf, secretary, as well as the board of governors, and the three speakers of the evening, who were George M. Graham, of the Philadelphia North American, Charles H. Grakelow, secretary of the Retail Florist's Association, and Ellis L. Howland, secretary of the Motor Truck Club of America, New York City.

These speakers gave talks in the order mentioned, Mr. Graham opened with a very humorous sketch of the now classic first motor truck run to Atlantic City, and ended by pointing out to the truck salesmen some of the viewpoints of truck users. He laid special emphasis on the fact that there were many and even more important talking points for the truck than its economy, such as expansion of business, more satisfied customers, saving on the horses remaining in service, etc.

Mr. Grakelow entertained very humorously with some stories, while Mr. Howland gave a most instructive talk on the history and work of the Motor Truck Club of America.

It is proposed to hold meetings of this kind each month, at which there will be talks by prominent men on pertinent subjects.

ADAMS BROTHERS COMPANY MAY BE REORGANIZED

W. D. McCaughey, receiver for Adams Bros. Company, Findlay, Ohio, who is operating the plant under a court order, states that several contracts have been made which will work up quite a considerable portion of the stock on hand. He gives the liabilities at \$105,000 and states that the inventory of plant and stock on hand which stood at \$186,000. As a going concern has been reduced by a new appraisement on a liquidating basis to \$120,329.18 or over \$15,000 above the liabilities. He is advising the stockholders and creditors to re-organize the company as soon as possible, to conserve the assets.

INTERNATIONAL MOTOR COMPANY WINS LONG LITIGATION

The litigation which was started some time ago between the International Motor Company and certain of its minority interests, headed by George B. Blakeslee, has come to a final settlement. According to Judge Manning, who filed a decree on May 14th, he declared that there was no cause for action and that the minority stockholders enjoyed no special privi-

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lege not enjoyed by other holders of the company's shares, and that their charges against the company fall far short of an actionable complaint for the abuse of fiduciary powers on the part of officers and directors of the International Motor Company. The rights of others are to be preserved and conserved as well as those of the plaintiff, and courts are not prone to attempt settlement of business policies in the management of corporations except where fraud and gross dereliction of duty is clearly charged and susceptible of proof.

THE NATIONAL AUTOMOBILE CHAMBER OF COMMERCE at its recent meeting in New York City, in discussing the question of service to the motor truck user on the part of the manufacturer and agent, decided that a closer adherence to the terms of the standard warranty was needed. A meeting of truck makers may be called for the purpose of defining the limits of such service. Standardization of truck design and the danger of proceeding too fast in this direction were also discussed at this meeting. It was agreed that standardization of equipment along proper lines was both desirable and feasible, but wide differences exist in fundamental characteristics between the most successful and widely used makes of commercial cars, and an insurmountable obstacle of standardization of such characteristics is the variation in working conditions and the kinds of work which motor trucks are called upon to do.

LOVELL-McCONNELL COMPANY DENIED INJUNCTION

The Lovell-McConnell Company, of Newark, N. J., recently asked for an injunction against the Sparks-Withington Company, of Jackson, Mich., and the Hudson Motor Car Company, of Detroit, which equips its machines with the Sparton horn, but Federal Judge Arthur J. Tuttle denied the injunction, promising to hear the case on its merit. The complainant claims that the Sparton horn is an infringement on the patent held by it. Judge Tuttle stated that he believed it was far better for a company wanting to stop the sale of manufactured products believed to be an infringement on its patent to litigate the case rather than obtain an injunction. He claims that the power of a judge to grant injunctions is unlimited, and it is therefore the duty of the judge to exercise this authority with the greatest caution. He further stated that he was not adverse to granting temporary injunctions, but wanted to be thoroughly satisfied of the merits of the case before taking such a step.

LEE TIRE AND RUBBER COMPANY ELECTS NEW OFFICERS

Lee Tire & Rubber Company, Conshohocken, Pa., has elected the following officers and directors: A. A. Garthwaite, who has been vice-president and treasurer, has become president; John J. Watson, Jr., first vice-president, and H. C. Coleman, treasurer. The board of directors, besides the officers named, are: J. Elwood Lee, Jr., Samuel Wright, M.

FIRESTONE COMPANY AGAIN EXPANDING

In order to meet the rapidly increasing demand for its product, the Firestone Tire & Rubber Company is again adding new additions to its plant.

When H. S. Firestone put his final O. K. on the plans for the brand new building in 1910, it seemed that this plant was large enough to take care of the Company's needs for years to come. The new building was completed and occupied in 1911. However, in 1912, it was necessary to again expand and new additions were added. 1913 found the Company again cramped for room, and they again expanded.

The year 1914 is but a repetition of the past, and the demand for Firestone tires makes it again necessary to add to the factory. One of the present wings 60 ft. wide and 5 stories high will be extended on the north 125 ft. On the south one of the wings will be extended 125 ft., with the basement and the first floor covering a space 140 ft. in width. This will give approximately 95,000 sq. ft. additional floor space. The original building was so arranged that the new additions do not impair in any way the efficient handling of the product.

During 1913, three new boilers were installed, having a capacity of 900 h.p. each, making 2700 h.p. in addition to the already large boiler capacity. These were ready for use by February 1914, and have been in continual use since that time.

The Firestone Company will install a new 4000 kilowatt generator and steam turbine to furnish additional power needed for the

extensions. The present switch-board will be replaced by a new gallery board 70 ft. in length.

After experimenting for over two years with cycle tires, until Mr. Firestone was satisfied that the company could turn out a cycle tire equally as good as the automobile tires, they have recently commenced manufacturing this new product. They are spreading out in this department as fast as possible in order to take care of the rapidly increasing demand for their cycle tires. These tires are made with two styles of tread, the Non-Skid, which is an exact reproduction of the automobile Non-Skid design, and also a corrugated tread.

MOTOR-PROPELLED VEHICLES WOULD SAVE \$1,000,000 A YEAR

According to figures taken from a report compiled by the Commission of Public Works and Civil Service Commission of Chicago, \$1,000,000 a year could be saved by the city if all her business houses and private citizens would use automobile and commercial cars instead of the 80,000 horses now in use.

On an average, every 100 horses litters the streets and alleys with one ton of refuse during a working day of eight hours. This amounts to 800 tons a day, or 493,934 cubic yards in a year of 300 working days, calculating 36 pounds to the cubic foot. This is more than 50 per cent. of the total of 953,856 cubic yards of street sweepings, including leaves, rubbish and dirt, annually removed by the street cleaning department. The total cost of cleaning the streets and

O'B. Hallowell, Charles Heber Clark, J. Carl De La Cour, H. C. Jones and John M. Detra. During the interim between the death of President Lee and the election of President Garthwaite, the duties of the presidency were filled by J. W. Johnson, who was vice-president.

PACKARD CARBURETOR PATENTED

Russel Huff, of the Packard Motor Car Company, has been granted patent No. 1,095,326, issued under date of May 5, 1914. Application for this patent was filed in 1907 and antedates the greater part of modern carburetor development, according to the Packard Company. This patent covers the Packard carburetor, and is assigned to the Packard Company. Milton Tibbits, patent counsel for the company, states that the two spring auxiliary air valve with its adjusting wedge, the control of this valve by the driver, and the closing of the main and auxiliary air intakes for obtaining a rich mixture for starting, are among the features that are broadly claimed.

E. O. SUTTON FORMS NEW COMPANY

Knox Motors Company, Springfield, Mass., has been incorporated under the laws of Massachusetts with an authorized capital stock of \$2,500,000. Edward O. Sutton recently purchased the assets and goodwill of the Knox Automobile Company. He, with the other incorporators, Harry G. Fisk and Charles H. Beckwith, were identified with the Mayo interests, formerly in control of a large part of the shares of the old Knox Company.

alleys of the city during 1912 was \$1,916,217, exclusive of the garbage and ash removal, weed-cutting etc. Fifty-one per cent. of this approximately is \$1,000,000. This is the sum actually expended in 1912 to remove the dirt and filth directly attributable to the use of horses.

Aside from the excrement of the animals, the constant wear of the pavements by the horses' shoes and the iron-tired vehicles, observes the report, "has a tendency gradually to wear out the surface of the pavement, which must be removed by the street sweepers. This source is of special importance in macadam pavements, as it is this material that forms practically all of the dirt which is removed from pavements of this class."

More than 600,000 tons of manure are produced yearly by the 82,000 horses, mules and cows maintained in the city. All of this has to be carted through the streets and a considerable quantity is spilled from the wagons to lie in the streets until swept up by the street cleaners. Several important conclusions may be drawn from the facts given: First, that the substitution of motor vehicles for horse-drawn vehicles will reduce the cost of street cleaning, lessen the wear of street pavements and help materially to decrease the city death rate; second, that use of motor trucks by the street cleaning department will effect further savings in the cost of street cleaning and ash and garbage disposal; third, that the elimination of horses will preserve street pavements, and fourth, that replacement of macadam pavement by more permanent pavement will lower the cost of street cleaning and maintenance.

S. A. E. SUMMER MEETING

The Society of Automobile Engineers will hold its summer meeting at Cape May, N. J., from June 23rd to June 26th. A large number of interesting and important topics have been scheduled and a number of instructive papers will be presented, including a résumé of the past six months' work of the Standards Committee and its Divisions. The entertainment Committee has arranged special entertainment and events of interest. The chairman of arrangements is Arthur B. Cumner, 1790 Broadway, New York City.

THE PROGRAM

Tuesday, June 23	
Standards Committee Meeting.....	2.00 P. M.
Meeting of Board of Governors of Sections	8.00 P. M.
Wednesday, June 24	
Business and Professional Session.....	2.00 P. M.
Entertainment by Sections of the Society	8.00 P. M.
Thursday, June 25	
Professional Session	9.30 A. M.
Professional Session	2.00 P. M.
Semi-annual Dinner and European Trip Lecture	8.00 P. M.
Friday, June 26	
Professional Session	9.30 A. M.
Adjournment of Professional Sessions	1.00 P. M.
Baseball games between Sections of the Society in the afternoon	
Games, Tournaments.	
Saturday, June 27	
Competitions in other sports.	

NEW DETROIT CLUB WILL STUDY EFFICIENCY

The Detroit Executive Club has been formed through the combined efforts of F. F. Beall, of the Packard Motor Company; Alvin S. Knoblock, of the Northway Motors, and E. St. Elmo Lewis, of the Burroughs Adding Machine Company, for the purpose of studying and preaching efficiency, with a view toward helping to increase the efficiency in all branches of manufacturing and retail businesses. The membership is limited to fifty, and there are no fixed dues or fees for membership; the membership charges to be fixed from time to time as may be necessary to meet the operating expenses of the Club. The by-laws provide for a small, compact-working efficient organization. Any subject taken up by the Club will be exhaustively studied and reported upon in such a manner as to enable the organization to present something of real value to the firms represented by its membership and possibly to others who may be interested.

LOVELL-McCONNELL vs. SALVINI ELECTRIC HORN

A final decree in favor of the plaintiff has been issued by Judge Hand in the U. S. District Court of the Southern District of New York. The Lovell-McConnell Company obtained a perpetual injunction and waived all questions of costs, damages and profits resulting from the infringement of its patents Nos. 923,048, 923,049 and 923,122. The defendant company assented to the granting of the injunction and waived all right to appeal the case. A similar settlement was made in the case of the Square Motor Horn Company, by the court issuing a perpetual injunction in favor of the Lovell-McConnell Company.

HORN MAKERS REACH AN AGREEMENT

An agreement has just been completed between the Lovell-McConnell Manufacturing Company, makers of the Klaxon, and the G. Piel Company, makers of the Long horn, whereby each company continues its present types of hand-operated instruments under their several patents. The Lovell-McConnell Manufacturing Company has agreed to allow the G. Piel Company to develop and put upon the market a line of motor-driven electric horns of similar construction to the hand-operated Long horn at present made by the G. Piel Company.

The litigation between these companies has been discontinued.

The H. W. Johns-Manville Company will continue to market the instruments manufactured by the G. Piel Company, as heretofore.

Personal Items

E. Pleasamor has resigned as manager of the International Motor Company, Allentown, Pa.

Edgar M. Church has been appointed sales manager and secretary of the Howard Demountable Rim Company, Trenton, N. J.

W. A. Frise has accepted the representation of the Tuthill Spring Company, of Chicago, for the State of Michigan, and will have his headquarters in Detroit.

W. Crighton Harris has resigned from the engineering firm of Crighton Harris & Company to become chief engineer of the Titan Storage Battery Company, of Newark, N. J.

A. R. Cosgrove, of Detroit, has been appointed sales manager of the Vulcan Electric Gear Shift Department, of the Cutler-Hammer Manufacturing Company, of Milwaukee.

D. E. Evans, formerly sales manager of the Admiral Motor Truck Company, of St. Louis, Mich., now has charge of the service department of the Goodyear Tire & Rubber Company, Detroit, Mich.

H. F. Crawford, who has been connected with Phineas Jones & Company, of Newark, for the last twenty-one years, has been appointed secretary and general manager of the Los Angeles branch, with headquarters at 1625 S. Los Angeles Street.

C. J. Holdrege, who has been connected with the motor truck industry in Chicago for the past seven years, is now connected with the Gramm Commercial Car Company, of Chicago, distributor of the Gramm trucks in that territory.

Nelson B. Hazeltine, formerly Philadelphia district sales manager of the Adams-Bagnall Electric Company, has joined the sales force of the Electric Storage Battery Company, making his headquarters at the New York City office, 100 Broadway.

Emil Gruenfeldt, chief engineer of the Baker Motor Vehicle Company, of Cleveland, has sailed for Europe, where he will make a two-months' stay. He expects to take a brief vacation in Germany and also make an investigation of recent foreign motor car developments.

Factory Items and Changes

H. E. Wilcox Motor Truck Company, Minneapolis, Minn., is bringing out a new 1500-lb. truck to sell at \$1050.

Indiana Commercial Truck Corporation, New York City, has been formed with a capital stock of \$10,000.

The Mack Truck Company will establish a large factory in Los Angeles, Cal., and will employ 300 workmen. Company manufactures the Mack and Sauer cars.

Kelly Springfield Tire Company is erecting a new addition to its factory in New York City, which will be completed July 1st. This will allow for an increase of 200 tires per day.

Aetna Motor Truck Company has secured a factory at Richmond Avenue and East Grand Boulevard, Detroit, Mich. It plans to build 200 trucks of two-ton capacity during the first year.

Independent Motors Company, Port Huron, Mich., is already making a 3000-lb. chain-drive truck and is about ready to announce a 1500-lb. worm-drive model. This is the old Cass Motor Truck Company, with new people in it.

Redsburg Motor Truck Company, Redsburg, Wis., has been incorporated with a capitalization of \$125,000, by E. N. McNab, E. E. Montgomery, Edw. Thom and J. Seamans, to engage in the manufacture of a motor truck formerly manufactured by the Piggins Motor Truck Company, of Racine.

Lewis Spring & Axle Company, Jackson, Mich., has disposed of its spring department to a company formed by Fred J. Keiser, who is president; Casper Haehnie, vice-president; A. L. Wuster, secretary and treasurer. The new company will operate under the name of the Alloy Steel Spring Company, and has purchased a portion of the plant of the Lewis Spring & Axle Company.

Four Wheel Drive Auto Company is erecting an addition to its plant, which will be known as Unit No. 6, consisting of a building 40 x 80 ft., to be used as a paint shop. This will give the company a complete plant in every detail, and it will have 46,000 sq. ft. of ground space. According to indications the large plant will be taxed to its full capacity as orders for trucks are increasing.

H. W. Johns-Manville Company's Duluth office has been moved to larger quarters at 327 W. First Street, in order to take care of its increased business.

Apple Electric Company, Dayton, Ohio, advises that reports spread broadcast regarding the fire which recently occurred at its plant have been greatly exaggerated. The fire was under control within an hour and the work is now going on in the usual manner.

Wm. P. Miller's Sons, Long Island City, N. Y., manufacturers of lubricating compounds, had their manufacturing department destroyed by fire recently. Considerable stock was saved and shipments made as fast as possible. They are rebuilding on the present site and will be in running order in less than a month.

Conventions of Interest to the Trade

National Conventions

June 13-19—at Toledo, Ohio. National Convention of Woodmen. Edw. C. Frank is chairman of the committee of arrangements.

June 17-19—at Minneapolis, Minn. National Wholesale Grocers' Association of the United States. Headquarters at Hotel Radisson. Oscar B. McGlason, President; Mr. Beckman, Secretary; J. W. Bragdon, Minneapolis, and H. Hutton, Stillwater, are interested.

June 18-19—at Buffalo, N. Y. National Hardwood Lumbermen's Association. Hotel Statler. Arthur W. Kreinheider, President of the Buffalo Lumber Exchange, is interested.

July 2-9—at New York City. Annual Convention of National Leather and Shoe Finders' Association. Merchants' Association will probably prepare for the event.

August 1—at Boston, Mass. National Convention of Florists. Chamber of Commerce may be addressed.

October—Louisville, Ky. National Convention of the Kentucky Bottlers' Association to be held in the Armory. Samuel Leidigh is President of both the State and National Associations.

State Conventions and Fairs

June 9—at Clarksburg, W. Va. West Virginia Business Men's Association to hold annual meeting.

June 16-17-18—at Des Moines, Ia. Iowa Retail Merchants' Association will hold annual convention.

June 23-25—at Florence, S. C. State Firemen's Association and Tournament.

June 23-24—at Saratoga Springs, N. Y. Convention of New York State Laundrymen's Association. United States Hotel to be headquarters. Business Men's Association may be addressed.

June 17-19—at Isle of Palms, Charleston, S. C. Southern Wholesale Grocers' Association. J. N. McLaurin is President.

June 23-25—at Galveston, Tex. Retail Merchants' Association of Texas. H. A. Eiband, President.

July 7-9—at Raleigh, N. C. Retail Hardware Association of Carolina. T. W. Dixon, of Charlotte, N. C., is Secretary.

July 14-16—at Cedar Point, Ohio. Ohio Retail Grocers' & Meat Dealers' Association to hold 15th annual convention.

August 11-14—at Fulton, N. Y. Oswego County Agricultural Society.

August 11-14—at Eldon, Ia. Big Four Fair Association will hold fair.

August 20-25—at St. Joseph, Mo. Interstate Fair and Stock Show. H. L. Cook, is Secretary-Manager.

Little Giant Sales Company, 1225 Park Avenue, Baltimore, Md., has taken the agency for the Velie truck.

Auto Truck Garage Company, Inc., Manhattan, N. Y., has been formed with a capital stock of \$50,000, by H. J. Benjamin, H. B. Embler and A. S. Brach.

The list of conventions given herewith is published each month so that commercial car manufacturers can communicate with the proper authorities with the idea of arranging to give lectures, illustrated talks, statistics, etc., to show the advantage of motor trucks in these various lines; also possibly to show and demonstrate their cars.

October 27-30—at Thomson, Ga. McDuffie County Fair Association. Ira E. Farmer is the president.

November 2-7—at Orange, Tex. Orange County Fair Association. Secretary L'Hommedieu is preparing for the event.

November 7-13—at Macon, Ga. Georgia State Fair. Harry C. Robert is Secretary and general manager.

December 1-4—at Des Moines, Ia. Convention of Iowa Retail Implement and Vehicle Dealers' Association. Commercial Club is interested.

Firemen's Convention

June 17-18—at Fairmont, Minn. State Firemen's Association Convention. A. J. Myler, of St. Paul, Minn., is Secretary.

June 17-18—at Napoleon, Ohio. Northwestern Ohio Volunteer Firemen's Association. T. W. Fisher, Secretary.

June 17-19—at Oconomowoc, Wis. State Association. G. A. Dibble, Secretary.

June 24-25—at Saginaw, Mich. Michigan State Firemen's Association. A. P. Lane, of Ithaca, Secretary.

July 21-24—at Maquoketa, Ia. Iowa State Firemen's Association. E. E. Parsons, of Marion, is Secretary.

July 28-29—at Bath, N. Y. Western New York Volunteer Fireman's Association. Charles Kandle, of Lockport, Secretary.

July 29-31—at Chambersburg, Pa. Cumberland Valley Volunteer Firemen's Association. Chambersburg fire department has charge of preparations.

August—at Geneva, N. Y. State Firemen's Association. Albert B. Leonard, Secretary, is preparing for event.

August 4-6—at Mansfield, Ohio. Firemen's Association and Ohio Police Association. Chamber of Commerce may be addressed.

August 10-14—at Connellsburg, Pa. Western Pennsylvania State Fireman's Association, Convention and Tournament. W. H. Sharah, of Braddock, Secretary.

August 19-21—at Geneva, N. Y. State Firemen's Association. Thomas Honohan, of Frankfort, Secretary.

August 26-27—at Greenwich, Conn. State Firemen's Association. Local fire department preparing for event.

September 23-25—35th Convention of State Firemen's Association. Address local fire department.

October—at Harrisburg, Pa. State Firemen's Convention. George S. Kroll, of York, State President.

October 20-23—at New Orleans, La. International Fire Chiefs' Association to convene. Chief Louis Pujol preparing for event.

Goodyear Tire & Rubber Company, Akron, Ohio, has recently announced a reduction of approximately 5 per cent. in the price of its individual block motor tires. The reduction was made possible because of the increased demand. Raising the production volume lowered the selling price.

DESires MOTOR 'BUS CATALOGS

The Penland Brothers Transfer Company, Pendleton, Oregon, desires the catalogs and prices of makers producing motor buses. The company is thinking of starting a bus line in that town.

DESires AGENCY FOR ONE, TWO AND THREE-TON TRUCKS, TAXI-CABS AND TOURING CARS

The Mattison Taxicab and Transfer Company, of 237 Hennepin Avenue, Minneapolis, Minn., is now operating a taxicab service, and desire to convert its equipment into one type of vehicle only. They would like to get into communication with manufacturers with the idea of becoming agents for one, two and three-ton trucks, as well as taxicabs and touring cars. The firm already has an organization and salesmen. Communications can be addressed to F. S. Mattison, General Manager.



One of the Heavyweights

The title refers not to the truck, but to the load which it was moving, which was said to be the heaviest single piece which had ever been moved in New York City. It was the vault door frame for the National Park Bank, and weighed a little over forty tons. The door was built by the Bethlehem Steel Company, of Bethlehem, Pa., and was hauled from the lighters by an hydraulic truck, using for this purpose a nine-ton trailer, on which the door frame was placed, making a total trailing load of practically fifty tons. The trailer had a wheel base of but twelve feet.

An interesting feature of the performance was the fact that Divine cushion tires were used on the truck, which vehicle is to be used by the Bethlehem Steel Company, for hauling ore in its iron mines in Chile. Its first work will be hauling heavy machinery from the seacoast to the mines. As there are grades as heavy as eight per cent, without let-up for twelve miles, this heavy haul was made as a test.

THE COMMERCIAL CAR JOURNAL

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PHILADELPHIA, JUNE 15, 1914

No. 4

Published the 15th of each month by the
CHILTON COMPANY

Market and 49th Streets

Philadelphia, U. S. A.

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THE TRUCK AGENT: HIS PAST, PRESENT AND FUTURE—MAKERS SHOULD CO-OPERATE

 **T**HERE seems to be a growing opinion that the truck agent cannot make any money. This has been caused by many conditions which have existed, but which are gradually being eliminated and will eventually disappear. There is no reason why the truck agent selling trucks to business men should not build up as good and as profitable a business as any men who sell machinery of any kind to business firms. One of the reasons which will bring about the agent's ultimate success is the fact that as a knowledge of the truck industry grows, it is more definitely recognized that the manufacturer is dependent upon his representatives, the agents. The inducements which have been held out to the agent have not been sufficient in many instances, but manufacturers now understand this and are catering more and more to their agents as time goes on.

Very early in the selling of trucks firms became agents in view of what had been done in the pleasure-car selling field. It took but a short time, however, for the agent to

find, to use the slang expression, that "he was up against it." To sell a truck to a business man proved to be a very different matter from selling a pleasure car to the same business man. He soon found that he had to know all about his prospect's business, his former methods of delivery, his costs; in fact, he had to make an exhaustive analysis in a large percentage of cases, and apparently had to prove to the prospect against his will that trucks would be an advantage.

In nearly every case the agent tried to prove truck superiority exclusively on the basis of economy. This was undoubtedly a mistake. It is only recently, and since the numerous other advantages which result from the use of trucks in any business have become generally known, that economy of operation is taking its true and secondary place among the arguments used by the successful agent.

Although a man insists on having his pleasure regardless of business conditions, it was soon found that when it came to expanding his business equipment, his views were very different. Periods of depression and seasons of business inactivity have affected very much more directly the truck agency than they have the pleasure car. The result has been that many a good agent, on the way to a permanent business, has given up handling commercial cars, because temporarily he could make money easier with pleasure cars. Other wiser ones retained their truck agency, but took on in addition one or two pleasure models upon which to fall back during slack periods.

Let us look at some of the early causes. In the beginning it was but natural that both manufacturers and agents followed the line of least resistance in disposing of their product. This was, of course, to the user who, having tremendously heavy loads to haul or where speed was a great asset, had found the horse inadequate. The contractors, builders' supply, mining and numerous lines of trade welcomed and were willing to take a chance on some kind of a power-driven vehicle that could handle enormous loads, and free them from the weaknesses of horse flesh. This naturally resulted in manufacturers making and salesmen selling the kind of trucks that these lines demanded; namely, heavy, large units.

As time went on, more and more makers, and more and more agents entered the business. Each looked at what had been done by the others, and as the majority of sales had been in the large vehicle and to the large unit users, they naturally followed their example, and manufactured and sold large units. This continued. The early users paid very dearly for their experiences with these early models, but owing to their inability with horses to do the large and heavy work satisfactorily and up to the speed requirements of twentieth century business methods, they continued to use power-driven vehicles even through their experimental and developmental period.

It is now gradually dawning upon those in the industry, and we are endeavoring to force this thought home, that too many and too great an effort is still being concentrated upon this one class of vehicle and user. Not that these vehicles are still crude or unreliable, but this great effort is being put into their sale because all of the lines of least resistance have already been solicited, and now the salesman finds himself working around and around in a limited circle among the possible large unit users, who have already been solicited many times; in other words, this outlet along the lines of least resistance for motor-driven vehicles has already been well canvassed, and it is now time that the great mass of people who are possible users be approached. A large percentage of these business people have never even been approached,

have never been solicited whatever, because nearly everybody in the soliciting business has been handling large units exclusively, units not suited to the work of the small haulers.

By slow degrees the field open to smaller vehicles has been realized, and makers and agents have entered it. But like the pleasure-car industry, first for the very wealthy, then for the middle classes; the truck industry was first for the very large cars, and then for the middle-sized units. This year the pleasure-car field has taken another step, and has brought the power-driven road vehicle within the reach of everyone, so likewise the third step in the truck industry must be the production and sale of a small unit at a very low price which will take the place of the single horse and wagon. With the production of such a vehicle in the pleasure-car field the possible number of purchasers jumps immediately from the thousands into the millions, in the same way in the truck industry the possible number of buyers as compared to those of four, five, seven, and ten-ton units quadruples, and this tremendous field has not yet been approached.

In the meantime, the poor agent has been struggling for existence without any too much help from the manufacturer. Some have already given it up as a bad job, not realizing that they are going out just when the possibilities for big business are beginning to open out. The manufacturer should retain these experienced men by catering to them in every way possible. Percentages just as high as practicable should be given. The dealer should be allowed time. He should not be handicapped by lack of parts nor be required to finance outright, what virtually amounts to a branch of the factory. The manufacturer can and should assist in this work and by changing these conditions, make it possible for an individual to act as an agent without being a man of immense means to start with. Conditions have been such that very few individuals could handle an agency. It required a company or a corporation, owing to the large capital required to carry on suitable service stations with their tremendous stock of parts and equipment, and their day and night requirements.

Agents should be allowed to handle other cars, pleasure cars, etc., as side lines, and should be given the heartiest co-operation in every way possible by the maker.

This year more than ever before manufacturers are announcing smaller commercial cars, which shows that one of the difficulties of the industry is being recognized, and this alone should be a hopeful sign.

The small, or as we call it, "the bread-and-butter car," is what the agent is looking for; something that can be turned over rapidly, and without prolonged solicitation for each sale; a car so reasonable that it does not look like a fortune in the way of investment to the small merchant; a car with which excessive service is not expected.

The agent and the dealer are the manufacturer's hands. It is only through them that the maker can expect to deal with the public at large. If the manufacturer does not co-operate, if he hampers in any way his direct representatives, the agent and the dealer, he ties his own hands; he curtails and limits the possibilities of increased sales. In the same way, if he co-operates and assists the retailer, he builds and strengthens his own position by ensuring an outlet for his product.

Therefore, we call attention to the importance of the dealer and agent and the fact that they require, at all times, help from the maker and that this help can come in no better form than in the production of smaller units; the bread-and-butter cars. The sale of serviceable, efficient small cars does not interfere with the sale of larger cars; in fact, they are

feeders, they are educators, they are disseminators of a knowledge of power-driven vehicles, they are the direct means by which the non-educated become educated, by which non-users become users. The small merchant, after using a small car, is educated to the fact that he can use at least one large unit in his business. Such users cannot be reached in the first place by the representative of a three or five-ton truck. They must begin in a smaller way, and be built up.

To sum up, we claim that the dealer is indispensable to the manufacturer: that one of the crying needs of the industry to-day is for the manufacturer to assist the dealer in every way possible, and that one of the ways in which this can be done now is by manufacturing small, efficient, and eminently practical bread-and-butter cars for the dealer to handle. With the maker's help, the future of the dealer is assured.

Steel and Rubber Markets

Steel Prices Lower

Although prices on nearly all steel commodities are considerably lower than when reported last month, the outlook for the coming month seems to indicate a slight rise as the mills are negotiating orders from implement makers and car builders. The mills are understood to be operating at about 55 per cent. capacity.

Quotations on June 11th were:

STEEL PRODUCTS PRICES

Bessemer steel, per ton, mill	19 50 a 20 00
Open hearth, per ton, mill	19 50 a 20 00
Sheet bars, per ton	20 50 a 21 00
Steel bars, soft base, half ex tidewater	1 26 a 1 31

The above prices are at tidewater in carloads and larger lots. For quantities less than 2000 lbs. but not under 1000 lbs., \$2 per ton additional is charged, and less than 1000 lbs. \$8 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots \$2 per ton higher.

Gauge—	Black.	Galvan- ized.	Gauge—	Black.	Galvan- ized.
Nos. 22 & 24.....	1 65	2 30	No. 28.....	1 80	2 75
25 & 26.....	1 70	2 45	No. 29.....	1 85	2 90
No. 27.....	1 75	2 60	No. 30.....	1 95	3 05

IRON AND STEEL AT PITTSBURGH

Bessemer iron	14 00 a
Bessemer steel, f. o. b. Pittsburgh	19 50 a 20 00
Muck bars	27 00 a
Skelp, grooved steel	1 20 a 1 65
Skelp, grooved iron	1 60 a
Ferro-manganese (8% per cent.), seaboard	38 00 a
Steel, melting scrap	11 50 a 12 00
Steel bars	1 10 a 1 15
Black sheets, 28-gauge	1 80 a 1 85
Galvanized sheets, 28-gauge	2 25 a 2 80
Blue annealed, 10-gauge	1 35 a 1 40
Tank plates, 34-inch and heavier	1 10 a 1 15

Rubber Prices Again Show a Decline

A continued light demand with few speculative operations have combined to pull down prices on nearly all grades of rubber. There seems to be an absence of pressure to sell.

Quotations on June 11th were:

Up-River—					
Fine	70 1/2	a 71	Balata, sh't	64	a 65
Coarse	41	a 42	Ciudad, b'k	48	a ..
Island—			Trinidad, b'k		Nominal
Fine	61	a 62			
Coarse	28	a 29			
Cameta	34	a ..			
Cauchao—					
Balls	42	a ..			
Centrals—					
Corinto	43	a 44	Massal, red	48	a ..
Esmeralda	43	a 44	Red C'go	48	a ..
Guatemala, slab	38	a ..	B'k C'go	48	a ..
Mexican—					
Scrap	43	a ..	Niggers	44	a ..
Strips and scrap	40	a 41	Gambia, prime	44	a ..
Guayule	Nominal				
Soudan—					
Niggers					
East India—					
Smk, sh'ts					
Ceylon, bis & sheets					
Pale crepe					
Pontianac—					
Prime plantation	6	a ..			
Palembang	6	a 7			

DOMESTIC SCRAP RUBBER

Boots and shoes	7	a 7 1/2
Tires—		
Automobile	4 1/4	a 5
Inner tubes	16	a 17

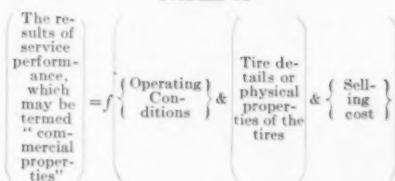
A General Summary of the Truck Tire Situation*

THE Truck Standards Division in its efforts to arrive at a universal schedule of solid tire carrying capacities satisfactory to all concerned, discovered that the situation is really quite complex and decided therefore that a synopsis of the solid tire situation as a whole might be worth while. As an introduction let me state that there is almost no opportunity to resort to theories and exact formulae in solid tire design, a fact which will be readily appreciated after consideration of the discussion which follows; experience and judgment being by far the chief requisites for producing results. It is fair to add, however, that the application of good engineering practice and methods can reasonably be expected to produce better results than could be obtained from the hit-or-miss attention of salesmen and factory workmen. It is unfortunate that the art has not progressed sufficiently to permit the presentation of data and facts which can be considered at all complete or satisfying. However, even though the absence of theories and data is so regrettable, I hope, since the truck tire problem is so intimately connected with the truck industry, to find that the following remarks will prove of interest, and especially that they may serve as a basis of starting something for the betterment of the situation.

Taken in a broad sense undoubtedly economy of truck operation is the real issue. It follows therefore that if an "economical tire" could be evolved an ideal solution would be at hand.

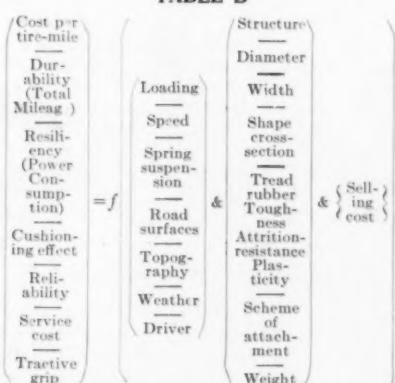
Solid tires in service under certain operating conditions give certain results in the performance of their functions. These results are dependent on the tires themselves and on the conditions under which the tires are used; consequently we may propose an equation which indicates a balancing condition as follows:

TABLE A



Expanding the terms in parenthesis by itemizing the features pertinent to this discussion we have:

TABLE B



The "commercial properties," representing as they do the results of service performance, are of particular interest as they are a measure of the satisfaction received. Cost per tire-mile, durability, tractive grip, service cost, and power consumption are all capable of being expressed by exact numerical values. Cushioning effect and reliability are indefinite but none the less important.

The "operating conditions," loading, driver, and to some extent, choice of road surfaces are under the control of the truck owner. The spring suspension is wholly and the loading to some extent under the control of the truck designer. Topography, weather, and in part the road surfaces must be accepted as they are. Of the operating conditions, loading and speeding alone may be expressed in numerical values.

*Extract from Paper for Summer Meeting of Society of Automobile Engineers at Cape May, N. J., June 23, 1914, by T. E. Hale, Experimental Engineer, Goodyear Tire & Rubber Company.

The items under "tire details" pertain to the physical properties of the tires themselves and are self-explanatory.

In this discussion it may be noticed that cost or money value is mentioned only in connection with the commercial properties of the tires. Of course the item of cost is present on the other side of the equation in the various subdivisions of the "tire details."

Without being specific as to the precise relation between cost and tire details, let it suffice to say that the value of the finished product is largely in the materials which enter into its fabrication.

This equation is explained as representing a balancing condition. Of course this is true enough if we have been careful to include all the component subdivisions relative to the main parentheses of the equation. It will shortly be pointed out that practically all the terms on both sides are variables between rather wide limits and that broadly speaking the whole situation centers about what we do not know and what we want to know about the effect produced on the "Commercial Properties" by changes or alterations of the various "tire details" or "operating conditions." To take an example, we might accumulate data upon a certain tire of average "physical properties" and which had been in service under average "operating conditions" (Chicago for instance) and for commercial properties we would find the cost per tire-mile to be $\frac{1}{4}$. The mileage given, 10,000, the power consumption, 9/10 horsepower-hour per ton-mile per tire, the tractive grip represented by an average coefficient of friction of .40, a service cost of 1/4 hours interruption of service in changing tires, and the cushioning in its effectiveness to reduce destructive vibration while not capable of definite expression in figures is nevertheless a very important and definite quantity.

Now, if we change any of the variables on the right-hand side of the equation this will naturally result in a change in one or more of the commercial properties. Assuming for instance that the speed (that is the average speed at which the truck is driven) be diminished, we will find the cost per tire-mile decreased, the durability increased, the resiliency altered, the cushioning effect increased, the reliability increased, the tractive grip probably increased and the service cost unaltered. On the other hand suppose we change one of the physical properties of the tire, say stiffen the compound. The cost per tire-mile would probably be reduced, the total mileage probably increased, the cushioning qualities decreased, the reliability unaltered, the tractive grip diminished, the service cost unaltered, and the power consumption decreased or increased according to road surfaces.

Although the circumstances are familiar to everybody, let us enter here as a matter of record and comparison the existing scheme of judging the satisfaction obtained from the service of solid tires. In a few cases, notably among the large owners, cost per tire-mile receives considerable attention, but in general it may be said that a tire which runs its mileage guarantee without developing any distressing symptoms is satisfactory, a tire that exceeds the mileage guarantee gets the business in the future, and a tire that fails to give the mileage gets a black-eye. Also it often happens that service helps to sell a tire.

The "commercial properties" should be discussed more or less in detail since they represent the satisfaction obtained from the use of the tire, and also the possibilities of choosing the best possible combination of component operative conditions and tire details to fulfill the requirements of the "economical tire." In what follows it should be borne in mind that economy of truck operation taken as a whole determines for our discussion the "actual values of the commercial properties of the "economical tire."

Cost Per Tire-Mile

Obviously it is desirable to have the cost per tire-mile as small as possible consistent with the complete qualifications for economical truck operation. This is one of the most important of the commercial properties in the matter of economy and it happens that it is dependent on practically all of the subdivisions of the operative conditions and physical properties of the tires. The better the road surfaces and more nearly level the country, the lower the cost per tire-mile. Likewise the tires will show up better under a careful driver than one who does not try to favor them. As for weather, extremes of heat and cold have a detrimental effect on the rubber, consequently increasing the cost per tire-mile. Spring suspension is mentioned as one of the operating conditions. This may seem a little far-fetched, yet we know that the efficiency of the springs in performing their functions has a very decided effect on the life of a tire.

Considering now the load on the tire and the speed at which the truck is operated, all will agree that the lighter the load and the slower the speed, the lower the cost per tire-mile, but returning to our fundamental idea of economical operation of the truck there is undoubtedly one combination of load and speed (assuming tire equipment of spe-

cific "physical properties") which will give a maximum effect in the matter of truck operating economy, yet the cost per tire-mile will be greater than were the speed to be slower and the load less. Again by simply altering one of the tire details, say stiffening the compound, an entirely new set of relations will be established, with the result that the economical load and speed will differ from those of the preceding case. Change the structure, diameter, width or shape separately or collectively and our economical load and speed have to be sought anew and also a new cost per tire-mile.

Durability

Strictly speaking durability is a property which is closely allied to that of cost per tire-mile and there is a strong temptation to believe that they are inversely proportional. The principal exceptions to this are to be found in the details of the tires themselves. Thus it is perfectly possible to compound the tread rubber to give a very low cost per tire-mile and at the same time produce a tire which would give but small total mileage. The same idea could apply in the case of the structure of the tire under certain circumstances. Apparently the predominant attitude of the wide-awake truck owners is decidedly favoring the choice of tires which run long mileages. The importance of uninterrupted operating schedules is undoubtedly largely responsible for this condition; moreover it is probably true that many owners would feel justified in sacrificing, if necessary, a slight saving in tire cost if it came to the point of choosing between the two properties.

Resiliency

Resiliency will presently occupy a very decidedly more prominent position in the list than it has in the past. The requirements of electric vehicle practice have for some time demanded the most efficient tires possible; some manufacturers even make the other commercial properties secondary to this one. Surely gas truck operators should recognize the possibility of greater economy from the use of efficient tires just as does the electric truck operator. An example will emphasize this point. It is very easy to pick out from among the brands and types of tires on the market those which will absorb 25 to 40 per cent. more energy than the most efficient; consequently if a 3-ton truck consumes say from \$400 to \$500 worth of gasoline a year, a very considerable cash saving could be made by using more efficient tires. As the rubber is "lively" or "dead" (by virtue of the nature of the compounding) so will it be efficient or inefficient when measured for power consumption. The stiffness or plasticity of the compound also plays an important part in the determination of efficient performance. Efficiency is very dependent on the character of road surface over which the vehicle is operated, particularly as to the distinction between rough and smooth road surfaces. Other things being equal the soft tread rubber will give greater efficiency on the rougher roads.

From the foregoing it will be seen that the resiliency of the tire is largely dependent on the compounding of the tread rubber. To what extent it is dependent on the other physical properties of the tire is somewhat uncertain, but surely not to any marked extent. The efficiency varies slightly with extremes of heat and cold; also with different loads and speeds.

Cushioning

The invention and especially the perpetuation of the India rubber tire were possible because of the benefit derived from the cushioning properties of the rubber as a lessener of uncomfortable and destructive vibrations. How many times has it been remarked that automobiles are possible because of the pneumatic tire? Is it not true that motor trucks would not be possible without rubber tires? Just think of a 3-ton truck equipped with steel-shod wheels rattling over the average pavement at 8 to 12 m.p.h.—and the poor pavement!

Of course the plasticity or stiffness of the tread rubber is by far the most important item affecting this commercial property and it goes without saying that a soft yielding compound will protect the mechanism of a vehicle better than a hard stiff one. The remaining items of tire detail each influence the cushioning effect in minor ways. It is rather unfortunate that up to the present time the tire companies have found no way of making a tread rubber of exceptional cushioning qualities and at the same time of low cost per tire-mile. We find that the softer and more yielding the stock the better its quality must be to give reasonable service, and quality represents price. This fact is also particularly noticeable: Tires made of soft compounds are very much more liable to fail structurally under heavy loading. It might be interesting to remark that there is one critical load for each size tire and for each speed where the cushioning is most pronounced; that is, a lightly loaded tire will bounce and thereby aggravate vibration; on the other hand a heavily loaded tire will show less response in cushioning due to its already highly distorted condition. Tires are similar to springs in this respect.

Reliability

The reliability of a solid tire in performing its functions needs very little comment. It is listed as one of the commercial properties because it is a property which is of considerable importance to truck operation as a whole. In the case of truck tires this property is practically entirely dependent on the tire details themselves.

Service Cost

The remarks concerning reliability apply equally well as to service cost; in addition there is of course the question of attention on the part of the selling house.

Traffic Grip

The effectiveness of the traction of a tire is dependent on the co-efficient of friction between the tread rubber and the road surface. Consequently compound, width, weather (wet or dry), loading and the character and condition of the road surface are the principal elements affecting traction. On dry surfaces there is no advantage to be found from the use of a notched or broken tread over the use of a continuous tread, for in either case the grip of the tire is dependent on the simple phenomenon of friction between the rubber and road surface. Wet or greasy pavements are well known to be annoying and often dangerous. The coefficient here is exceedingly low, ranging from .11 to .15 or .20, whereas it would be from .50 to .60 on dry pavements. I believe that under certain conditions the coefficient of friction between the tire and the surface can be greater than 1.00. This seems conceivable in the instance of a soft yielding tread compound on a firm rough surface.

Wear and Failure

So far nothing has been mentioned about the ways in which tires wear out or fail. This should be outlined briefly as several of the commercial properties are directly dependent on the wearing qualities of the tires. You will notice that the various items under each main subdivision are enumerated as forms of legitimate wear or as forms of abuse. The significance of this is suggestive rather than absolute, the idea being to convey the distinction which one would observe in the case of perfect service.

TABLE C

<i>A—Abrasion of tread rubber, due to</i>	
1—Tractive effort	Legitimate wear
2—Natural wear of rolling friction	
3—Skidding	Abuse
4—Spinning wheels by quick starts	
5—Sliding with brakes set	
6—Wheels out of alignment	
<i>B—Cutting, chipping, or spreading of tread rubber, due to</i>	
1—Sharp stones, glass, etc.	Legitimate wear
2—Poor road surfaces in general	
3—Car tracks	Abuse
4—Use of anti-skid devices	
<i>C—Disintegration or deterioration of tread rubber, due to</i>	
1—Sun and heat	Legitimate wear
2—Allowing tires to freeze	
3—Oil on garage floor	Abuse
4—Heating by excessive speeding	
<i>D—Failure of the tire structurally, due to</i>	
1—Overloading	Abuse
2—Speeding	
3—Shocks and impacts from reckless driving over uneven road surfaces	
<i>E—Premature failure or wear due to imperfections of manufacture</i>	

The foregoing is an exposition of the relevant elements entering into the determination of the proper tire sizes. This method of elaborating on the situation is apt to leave the inference that the situation is so hopelessly complicated that there is nothing in particular to be done except make the best of it. On the other hand, I realize that there are many who, although they will not dispute the truth of the facts presented, will be tempted to depreciate their significance, preferring to dispose of the matter by insisting that "tires are tires" and that it is up to the tire companies to produce the goods. Before us is a summary of the items by which the service performance of the tires are judged and an exposition of the factors on which these various items depend, and finally the possibilities to be taken advantage of in the way of attempting to regulate the tire problems toward more satisfactory ends. You gentlemen know to what extent operating conditions can be controlled and regulated. As for tire details those having a knowledge of tire design and manufacture realize that with proper attention to compounding and fabrication methods a wide variety of constant results is possible. I wish to bring out one point very emphatically, however: While it is possible to alter tire details so that results shall vary through a wide range, it is also true that if

these details be altered with the idea of highly perfecting one commercial property, this may be at the sacrifice of some other property or properties of nearly equal importance.

What does the motor truck industry want as qualifications for a satisfactory motor truck tire. In other words what is the relative importance of the commercial properties? Are we getting all the cushioning effect desirable consistent with economy of truck operation? Should not more stress be laid on the property of power consumption for the ultimate benefit of economic truck operation? How much should we sacrifice in the cost per tire-mile property and the durability to balance the other properties for the good of economical truck operation? Manifestly all are not of equal importance. For instance if the cushioning effect be highly developed with the idea of decreasing the truck repair expenses by lessening the destructive vibration, this much is certain, the tread rubber will necessarily be of a soft yielding compound in such an idea. But we will find the cost per tire-mile increased and the durability diminished very materially unless we diminish the load which the tires carry, which in turn will raise the ton-mile cost of truck operation. To a slight extent, with the introduction of additional cushioning effect, the resiliency and tractive grip may or may not be altered.

If the stiffness or plasticity of the tread rubber of the various brands and types of tires be compared, it will be found that there is a wide variation. In spite of this, well-known makes of trucks in any locality, equipped with competing tires which exhibit these marked differences, will be found running side by side. Surely so important a property as that of cushioning effect should be more or less uniform under similar conditions. I often ask engineers, owners, and drivers whether they want a hard, stiff tire which will give almost no cushioning to the truck, or a tire which will protect the truck even if the tire-mile cost is a little higher. Some have never given the idea any thought, some (users particularly) do not care anything about the tire so long as it wears, some are looking for information, and a few have such decided convictions in favor of proper cushioning effect that they will not use solid tires of any description and choose the more expensive pneumatic.

This illustration of the relations between cushioning effect and the plasticity of the tread rubber is typical of a multitude of combinations of properties and conditions which might be portrayed. It would be an endless and wearisome task to enumerate and discuss all these combinations.

At the present time the formalities of truck tire merchandising are limited to a guaranty of perfection in workmanship and a certain maximum cost per tire-mile. Also, each tire company has its own special list of permissible load which each size of tire may carry. Without dwelling on the shortcomings of this happy-go-lucky method of dealing in tires, permit me to call to your attention that in the iron and steel world it is customary to buy and sell material which fulfills the

requirements of certain chemical or physical specifications. The art has been perfected to such an extent that the measurement of the elemental subdivisions is now a matter of every-day routine in the up-to-date office, and moreover it is recognized that buying on specifications is the only sane policy—fair to both purchaser and seller. Standardization is not by any means limited to steel; Portland cement, paints, chemicals, electrical apparatus, boilers, etc., are all more or less thoroughly standardized.

In outlining the solid tire situation I have proposed an equation representing a balancing condition between the results which the tires give in service on one side, and the details of the tires themselves, the cost of marketing, and the conditions under which they are used on the other. By developing this equation in detail I have attempted to emphasize:

1st. The complexity of the solid tire problem due to the innumerable variables into which the whole may be subdivided.

2nd. The importance of recognizing that economy of truck operation in its broadest sense should be the guiding motive behind any solid tire considerations.

3rd. The fact that the performance of solid tires in service has never been given the proper attention in the matter of criticism from the angle of economic truck operation as a whole.

4th. The logic of recognizing the "commercial properties" and the desirability of discovering their relative importance.

5th. The limitations encountered in bringing about ideal conditions due to practically positive inability to regulate or control the operating conditions which are included under road surfaces, topography, weather, and driver.

6th. The facts that the solid tires are still capable of considerable development and that this development is essentially a process of evolution and elimination; also that there are certain practical limitations in the production of the tires themselves which permit the attainment of high degrees of perfection of certain commercial properties only at a sacrifice of others.

Conclusion

In conclusion I simply venture a general summary. The ideal disposition of truck tire standardization would be to prescribe standards of commercial properties to be attained when the tires are in service under standard road surface conditions; the variables under this scheme would be the tire details. However, inasmuch as it would be impracticable, to say nothing of being cumbersome, to test each tire for the values of the commercial properties, to determine whether they come up to standards or not, it would develop that once we have arrived at and defined a satisfactory condition in the matter of service performance, the simplest proposition would be to take cognizance of the physical properties of the tires themselves and standardize them together with the loadings, speed, and spring suspension.

For the further instruction and improvement of drivers, the club has arranged through its technical committee for a course of five correspondence lectures, for drivers, which is offered to drivers employed by members of the club at a nominal fee. The club is also undertaking to standardize shop practice and repair charges, with a view to keeping certain few garagemen from "gouging" truck owners in their charges.

SEEKING BETTER IDENTIFICATION FOR CARS

Owing to the variety of shapes and sizes of license tag prescribed by the laws of the various states, as well as conflicts as to the manner in which tags shall be displayed, automobile manufacturers have thus far been unable to arrive at an entirely satisfactory method of mounting the tag, while purchasers of new cars often find it difficult to label them in a perfectly lawful manner. With a view to obviating these difficulties the Society of Automobile Engineers at its summer meeting at Cape May, June 23-27, will consider the advisability of recommending a uniform style of tag, which could be mounted in a uniform manner, and which would not only satisfy every reasonable demand, but also be a source of no trouble to the owner.

MOTOR TRUCK OWNERS IN MUTUAL SUPERVISION PLAN

In following out a suggestion which appeared in the editorial columns of a recent issue of *THE COMMERCIAL CAR JOURNAL*, the motor Truck Club has lately undertaken a new plan for reducing the abuse of motor trucks, especially among its members, by establishing a mutual supervision department through the club office, whereby every member observing a truck being carelessly or recklessly operated reports the fact to the club office, which in turn notifies the owner. The aim is to persuade the driver to maintain greater prudence. If he drives at a reckless speed, or carelessly as to pedestrians, or over obstacles which are likely to damage tires unnecessarily he is likely to hear from it at the hands of his employer.

To further this work, the club has issued several hundred post cards to its members and others desiring to enlist in the volunteer inspection work, to be filled out and sent to the club headquarters whenever one sees any form of truck abuse. This week several cases of driving trucks without suitable tire equipment have been reported, not only to the owner of trucks, but to the tire companies and the truck makers who are interested in guarantee questions, and apparently the service is appreciated.

Tap Drill Sizes and Causes of Stripped Threads*

THERE are many arguments in favor of a tap drill list which can be applied to commercial practice. All tables which have ever come to the writer's notice have been incorrect from a practical standpoint, as they either gave a 100 per cent. depth of thread or have approximated it. They were evidently figured out very conscientiously by someone who never had to tap holes. But a worse condition than having a tap drill list that should not be followed, is to have someone who ought to know better insist that a table be followed because it is given in some handbook; that it must be right in spite of torn threads, broken taps, half reamed out holes, etc.

Effects of Use of Impracticable Drill List

One factory labored under such a condition for a long time, all tap drill holes in the jigs being made religiously wrong, that is to give a 100 per cent. thread according to the table properly issued and approved, and the condition was not changed until after a couple of years' work between a liberal-minded chief inspector and the tapping and screw-machine departments, during which time an unofficial table, allowing a depth of thread varying from 45 to 80 per cent., to meet different conditions, was made up and all tap drill holes re-drilled free-hand sub rosa in the tapping department to these sizes and the results carefully watched. Before this there had been much trouble because the operators would re-drill the holes on their own responsibility and often get them much too large.

A confession of the deviation from orders was made and the matter was put up for revision. A thorough investigation was made and the findings were that no fault could be found with the results, and that the tapped work was better and less expensive, even with the extra redrilling operation. The table that had been evolved and corrected was then adopted, and the tool room was soon busy changing the drill bushings in the jigs to provide the proper tap drill sizes.

Tendency to Ream Instead of Tapping

A tap to start into a hole must not only cut but lead itself in. The point of the tap is made slightly smaller in diameter than the tap drill hole. The resultant force required to send the tap through the work is a combination of a rotary force to cut or ream the chips out and a forward thrust force to guide the tap ahead as it cuts the thread. The first of these forces is supplied by the tap wrench or machine spindle; the second, except in a few rare cases, should be supplied by the tap itself after the first initial "bite."

With a 75 per cent. depth of thread the surface is backed up by a broad section and as the tap in the walls of the thread has no clearance to the cutting edge, the surface acts as an efficient guide and carries the tap ahead as it cuts.

Why Taps Ream and "Step" With One Hundred Per Cent Thread

With a full or 100 per cent. depth of thread the resistance to the rotary force is much greater as the area of the chip removed.

Other Factors Than Depth of Thread of More Importance From Stripping Standpoint

Torn, crumpled, crossed, reamed and stepped threads are all prolific causes of stripping, and when produced with properly made taps are generally due to too small tap drill holes. There are, however, other factors that are greater causes of stripped threads. Threads that are imperfect on the angle, being less than 60 degrees or hollow, thereby having a weaker section, increase the tendency to strip; threads that have too great a difference in pitch diameter sizes reduce the effective triangular area of the thread and thereby its rest-

Why Errors in Lead Sometimes Cause Stripping

Not only in this way do we lessen, by looseness and decreased effective thread area, the shear-resisting strength, but if the lead on the screw is long i.e., if the normal number of threads per inch occupy more than an inch, or if the lead in the tapped hole is short, or if both these conditions exist together, or if in any combination of errors, the lead of the screw is longer than the lead of the nut or tapped hole, we have an ideal condition for stripping. In other words, such conditions provide what is termed a "shear cut" by blanking and shearing machinery builders.

Effect of Lead on Screw Being Longer Than Lead of Tapped Hole

Fig. 5 will make this clear, with the following explanation: Here we have contacts at A, B, C and D. The thread at A-B in the nut takes the entire strain of the screw as it is tightened and that at D-C, being on the opposite side from the pressure, tends to open as the screw is tightened. The tendency of the strain concentrated at A-B, instead of over all the thread, is to strip or upset and weaken the thread at this point. A continuation of the tightening operation would extend the stripping action progressively along the helix, with a shearing action as shown graphically by the diagram in Fig. 5. Thus it is seen that errors in lead not only affect the diameter sizes and the overlap and are thus vital factors in the fit and strength of the thread, but that they are also apt to furnish the very best means for shearing or stripping threads that could be planned. More vital then is proper measuring or gaging of threads to see that the lead is correct and the pitch diameter of the screw up to size than the mere matter of testing the threads with a thread gauge, which only insures that they screw together no matter how inaccurate they are.

To Measure Lead Simply and With Commercial Accuracy

A simple and inexpensive means for measuring the lead of threads is rapidly coming into general use. I refer to the gages shown in use in Figs. 6, 7, and 8. These gages are very accurate and with little practice an inspector or operator can detect such slight errors as .002 in. per inch, and detect instantly whether the lead is short or long.

Screw Lead Should be "Short" Tapped, Hole Lead "Long"

In other words, good thread work must be governed by the rule that the lead on screws should never be longer than the normal and the lead on tapped holes should never be shorter than the normal.

Sufficient Overlap

What constitutes sufficient overlap? It is the opinion of many capable men, after a study of the theoretical side of the matter and extensive practical tests, that sufficient overlap is had by retaining that portion of both the screw thread

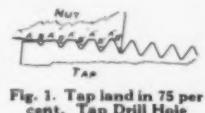


Fig. 1. Tap land in 75 per cent. Tap Drill Hole

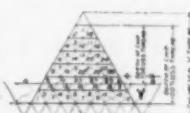


Fig. 2. Proportion of areas of chip in 75 and 100 per cent threads

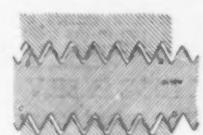


Fig. 3. Weak leading ridge in 100 per cent thread

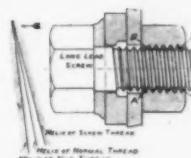


Fig. 4. Diameter of screw reduced on account of error in lead

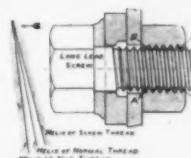


Fig. 5. Long lead screw with short lead tapped hole and diagram of shearing action

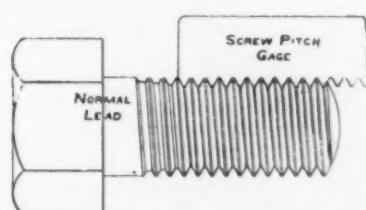


Fig. 6. Screw pitch gage checking normal thread

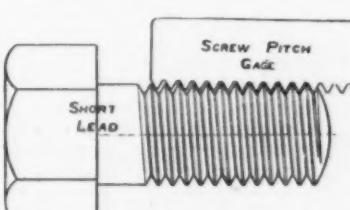


Fig. 7. Screw pitch gage rejecting short lead

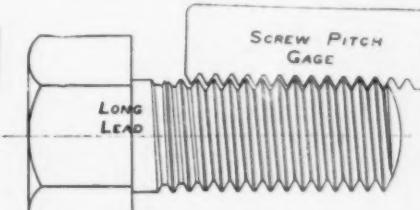


Fig. 8. Screw pitch gage rejecting long lead

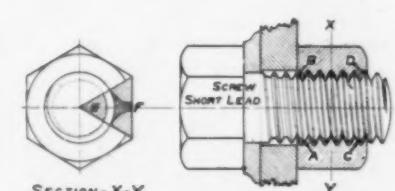


Fig. 9. Relative strength of nut and screw and correct combination of short-lead screw with long-lead nut

In addition to this the leading or guiding surfaces for a 100 per cent. thread are much narrower and weaker at the starting of the tap, and the end of the tap is apt to act as a taper reamer and cut off these slight projections, thereby depriving the tap of its ability to lead itself into the work. This shows how unfavorable to good threading a 100 per cent. depth of thread is, if only this one condition, viz., greatly increased resistance to the forward travel of the tap and the greatly decreased leading ability alone, are considered with the attendant reaming and "stepping" of the threads.

*Extract from Paper for Summer Meeting of the Society of Automobile Engineers at Cape May, N. J., June 23, 1914, by H. E. Harris, consulting engineer, Granfield Tap and Die Corporation.

and the nut thread which, in combination, offers the greatest resistance to shear obtainable, enough extra metal being allowed to prevent a spinning-over or burring action.

Difference in Pitch Diameters More Dangerous Than Small Overlap

Overlap as a factor to resist stripping is not nearly as important as proper fit on the pitch diameter. When there is considerable difference between the pitch diameters of the tapped hole and screw, whether from incorrect gaging, or to allow for errors in lead, or because of poorly made or off-size taps and dies, the section of the thread is weaker where the combination of the greatest strength is made and the tendency to burr over and strip thereby greatly increased.

Why 75 Per Cent Depth of Thread Is Recommended

Seventy-five per cent. depth of thread is more desirable than 100, because, in addition to improved threading, it results in a vast reduction of breakage of taps. A common saying in regard to taps is that 90 per cent. break instead of wear-

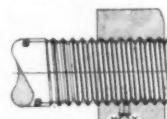


Fig. 10. Greatest shear-resisting strength in threads

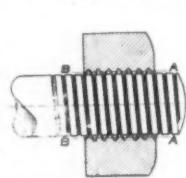


Fig. 11. Shear-resistance minimized by removal of area of greatest strength on screw threads

DRILLS FOR S. A. E. TAPS. (Formerly A. L. A. M. Standard)

Size No.	Threads per Inch	Root Diameter	Drill Size
1	28	204	215
1 1/2	24	224	227
2	24	321	344
2 1/2	20	373	389
3	20	435	454
3 1/2	18	496	508
4	18	553	571
4 1/2	16	606	627
5	16	669	689
5 1/2	14	731	821
6	14	784	805
6 1/2	14	902	930
7	12	1,017	1,044
7 1/2	12	1,142	1,169
8	12	1,254	1,294
8 1/2	12	1,392	1,419

Fig. 16

ing out. This is doubtless at least approximately true in average tapping practice. This means not only large tap expense but expensive delay in getting new taps and resetting machines, and, not least by any means, the costly processes used with occasional success to remove broken taps and the expensive pieces rendered useless by having broken tap-ends left in or having the tap holes spoiled in the attempt to remove the taps.

Factor of Safety of Taps

The average factor of safety of taps is usually considered as 2, although a great many taps have

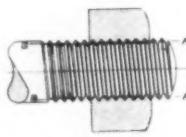


Fig. 12. Greatest shear-resisting strength retained in 75 per cent depth of thread in tapped hole

DRILLS FOR MACHINE SCREW TAPS

Size No.	Threads per Inch	Root Diameter	Drill Size	Size No.	Threads per Inch	Root Diameter	Drill Size
0	80	.044	.048	9	24	.123	.126
1	72	.055	.060	10	32	.149	.160
1 1/2	64	.053	.058	10	36	.147	.158
2	64	.068	.071	10	24	.136	.149
2 1/2	56	.053	.057	12	24	.170	.181
3	56	.076	.082	12	24	.162	.175
3 1/2	48	.072	.079	14	24	.188	.201
4	48	.085	.092	14	20	.177	.193
4 1/2	40	.080	.086	12	20	.209	.224
5	36	.076	.085	16	20	.208	.219
5 1/2	36	.095	.103	18	20	.229	.245
6	40	.093	.101	18	.18	.222	.240
6 1/2	36	.099	.106	20	.20	.257	.271
7	40	.106	.114	20	.18	.248	.266
7 1/2	36	.102	.111	22	.18	.274	.292
8	32	.097	.106	22	.16	.265	.285
8 1/2	36	.115	.124	24	.16	.309	.318
9	32	.110	.121	24	.16	.291	.311
9 1/2	30	.108	.119	26	.16	.317	.337
10	36	.128	.137	26	.14	.305	.328
10 1/2	32	.125	.134	28	.16	.345	.363
11	30	.121	.132	28	.14	.331	.354
12	32	.136	.147	30	.16	.369	.389
13	30	.134	.145	30	.14	.357	.380

Fig. 14

United States Standard Thread Taps, kept in commercially sharp condition.

By tapping into a tap hole that will have a 75 per cent. thread, the factor of safety of all taps is materially increased. An average of a large number of tests shows conservative factors of safety in different materials as shown in the table. These figures are for the U. S. S. threads. It is

MAKING A TRUCK RIDE EASILY

This is a matter of fitting springs having a proper range of motion, a constant unit of motion per unit of weight carried, and that will resist tendencies of the body to roll from side to side. In other words, the springs should allow a sufficient, but not excessive amount of axle movement in relation to the body, and the weight carried by the springs should increase or decrease at a uniform, or nearly uniform rate, as the axle is nearer to, or further from, the body. And at the same time, any tendency of the body to roll to a position in which one side is nearer to the axle than the other, must be actively resisted.

reasonable to believe that the S. A. E. thread taps, due to the much finer thread in proportion to diameter, would have a larger margin of safety

The Wells Tables of Tap Drill Sizes

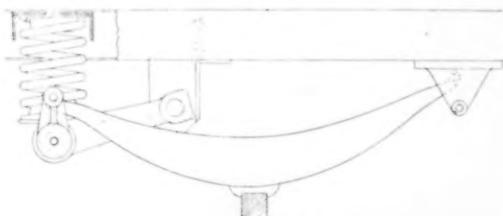
The Wells tables of tap drill sizes for machine screw sizes, for U. S. standard threads and for S. A. E. threads—are safe and practical and have a wide margin of safety, as has been shown by repeated tests. They give a .75 per cent. thread, whereas a $\frac{1}{2}$ in. 13 soft brass nut of ordinary length with but 50 per cent. thread when screwed onto a chrome vanadium steel bolt will, in a tensile strength testing machine, cause the bolt to part across the root of the thread without upsetting or stripping the threads in the nut. The use of these materials in this combination represents almost the extreme conducive to stripping.

Important to Use Exact Size Drills

As the ordinary size drills, known by number or fractional size, do not coincide with the correct decimal size given in the table, and in some cases do not even approximate them, and because a few thousandths variation towards a smaller hole is expensive, due to the increased percentage to tap breakage and a variation towards a larger size may be objectionable, we have been compelled to stock a complete line of decimal size tap drills. With the drill size stamped on the tap, the only excuse for error disappears. We feel that this will become standard practice as soon as the users and tap and drill makers awake to a realization of what constitutes correct and economical thread practice.

of possible axle movement, which in this case was insufficient. As the helical springs are "in series" with the leaf springs, this total movement has the easy progression of the helical springs.

These installations have been amply justified by the saving in tires and mechanism, and by increased reliability. Spring breakages, which formerly caused frequent lay offs, have almost entirely ceased, though these trucks are allowed a faster schedule and carry more weight than formerly. The strain on both trucks and drivers due to vibration jolting, and the necessity of slowing up for or avoiding small road inequalities has been materially lessened.



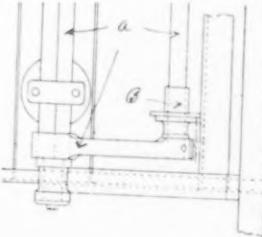
Spring System on Two-Ton Mack Brewery Truck

It was designed and installed by W. R. Williams

Rolling is best resisted by short leaf springs which have a rapidly decreasing period of motion per unit of weight carried.

If the action of these leaf springs is supplemented by helical springs having the proper progression and range of motion easy riding may be obtained, if the helical springs are so controlled that the body cannot roll from side to side because of their soft actions.

In the sketch shown, (of one of two five-ton Mack trucks so equipped, both front and rear, for the Ebbing Brewing Company, New York City), the leaf springs must allow very little motion, as the load is carried very high, and the slightest rolling would be disastrous. The helical springs, which are controlled by the rock frame A, journaled to both sides of the chassis as at B, so that only vertical movements of the chassis are permitted from their action, have a 7 in. range of movement, thus about doubling the range

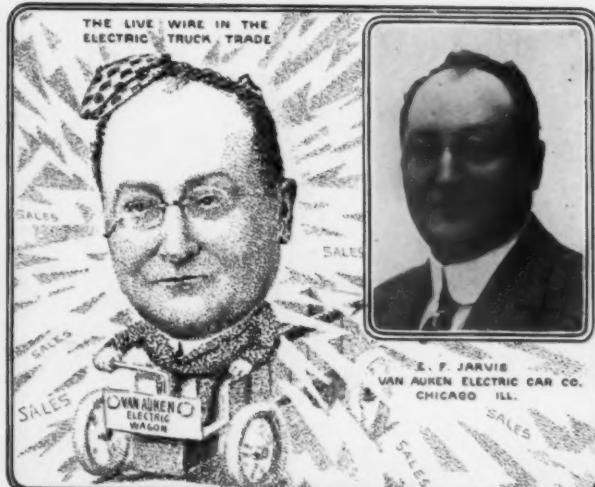
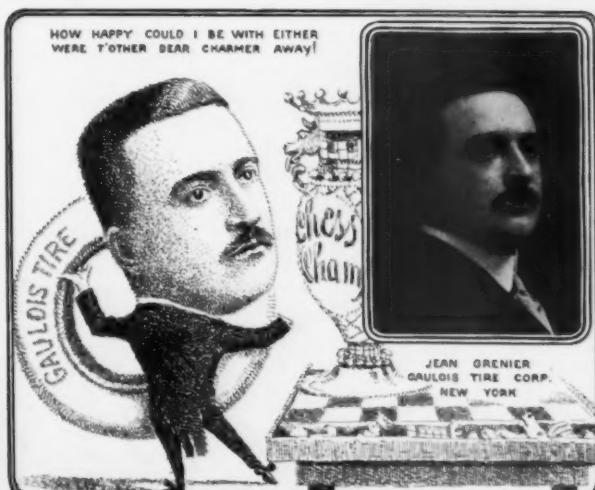
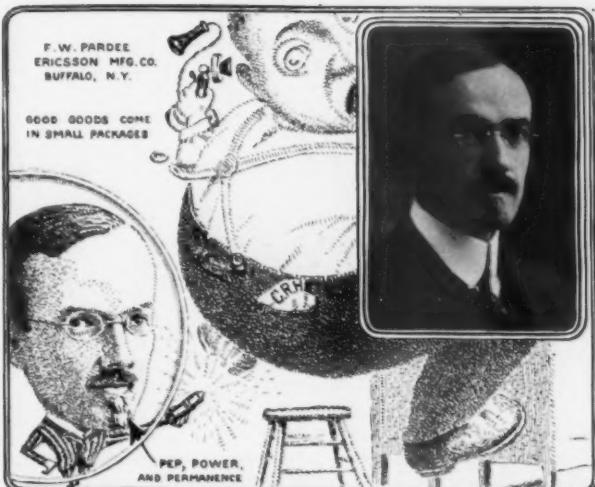


Delta Electric Hand Lamp

Weights 8 oz. without battery; is $8\frac{1}{2}$ in. high; has 2-in. lens, and uses a regular No. 6 battery; all completely incased in a cold-rolled steel housing which completely protects the parts. Manufactured by the Delta Electric Company, Marion, Ind. Price, \$2.

Fig. 15

CCJ GALLERY of SALES MANAGERS



Commercial Car Application to Many Diverse Lines of Business

With Special Reference to the Body Equipment as a Factor in Economical and More Efficient Service



EVERY year the truck body becomes a more important part of the complete vehicle. As time goes on the diversity of motor truck application increases rapidly, and we now find power-driven trucks in almost every conceivable line of business.

The chassis is more and more being recognized as a standardized and serviceable unit, and greater attention is being given to special bodies which make the truck more valuable in the particular field in which it is used.

In the following instances which are here cited will be found cases in which trucks without any special body equipment or arrangements have been found almost too expensive to use, but after being fitted with special bodies, have become great money savers, and indispensable to the business. This is true of many installations. Truck salesmen of the right kind are more and more enlisting the services of the drafting and engineering corps to produce bodies which will facilitate the handling of the particular class of goods which must be moved.

THE MOTOR STORE

The Alma Motor Truck Company, of Alma, Michigan, has recently built for E. A. Eriksen, of Greenville, Mich., a motor store, using a Republic Truck upon which is built a specially designed body, fitted with shelving and all the accessories of an up-

to-date store. Mr. Eriksen stocks the store with a complete line of general merchandise and makes a trip of 50 miles each day, and serves about 500 families each week.

The Motor Store is a novel venture in the merchandising world, but has succeeded beyond the fondest expectations of the purchaser, proving a great trade winner, and most satisfying to a profitable patronage. Farmers are clamoring to be placed on the motor store route, for by this means they are enabled to purchase their supplies at their door and market their produce without loss of time at the busiest season of the year, as the motor store pays cash for farm produce.



Dental Demonstrating Car

Public demonstrations of advanced dentistry are being made from the platform of a White car, owned by Painless Parker, a well-known practitioner of New York City. In fact, Dr. Parker has no less than eight demonstrating machines. The car is fitted with a stepladder leading to a platform on which is mounted a metal chair.



The Motor Store

A Republic truck fitted with a special body, which is practically a general store on wheels

A SPECIAL BODY FOR STEEL SECTIONS

Unlike many mercantile concerns who have found it advisable to change their methods of handling stock in order to attain higher efficiency from their motor truck, the adoption of motor delivery by steel and iron companies has not necessitated very many changes in stock handling. In many cases the road methods that were employed when horses and wagons were used have been developed to meet the greater capacity and speed of the motor truck.

In delivering steel and iron the use of motor trucks has been simplified by the almost universal use of cranes in loading. From the earliest days of the industry it has been necessary to use mechanical loading devices because of the great weight of nearly all sizes of stock.

In loading their 5-ton White truck the Scully Steel and Iron Company, of Chicago, employ the facilities that are regularly used in the moving of material in the stock department.

To handle heavy steel and iron of extra lengths without even using a loading platform would seem unusual, but the Scully Company found it practical to drive their truck in between the piles of stock and load the truck with the same crane that regularly moves the material in the stock department.

Consequently, when they purchased their first White 5-ton truck, they drew plans for a body that would exactly fit their present loading facilities.

An interesting phase of the Scully loading operation is the use of a frame at the extreme front of the White truck, on which the forward ends of the stock are carried, adding considerable to the length of the loading space and making it possible to haul material that would be too long for an ordinary body. The main platform body differs only slightly from the standard type of stake platform. The floor has three heavy cross sills of oak, designed for the double duty of preventing excessive wear or cutting of the platform and to provide clearance for the easy removal of the tackle by which the load is lowered.

The loading frames are braced from the main chassis frame and are held at a height equal to the platform. These frames are 18 x 12 in. Sufficient clearance is allowed between the load and the bonnet of the engine so that the bonnet can be raised, if necessary, when the truck is loaded. It will be noticed also that when the truck is carrying material in this manner, the center section of the platform is unoccupied but without materially affecting the distribution of weight. An illustration of this truck was published in a former issue of the *Commercial Car Journal*.

Demountable Bodies Make Trucks Pay

An Interesting Example of How Demountable Bodies and Special Loading Platforms Made Trucks a Valuable Asset Where Formerly it Was Decided Trucks Did Not Pay



ONE of the most interesting examples of the scientific use of commercial cars is that of the Greenpoint Metallic Bed Company, of 226 Franklin Street, Brooklyn, N. Y. About a year ago this company purchased a two-ton Packard to be used in delivering metal beds to the railroads, steamships, docks, stores, and also individual purchasers.

The truck was in service about six months, performed well, but it was decided that it did not pay to use it, and that horses were just as good and somewhat cheaper. The reasons for this conclusion, as now seen, were that the truck remained idle so long when loading that its efficiency was cut below the point at which it paid.

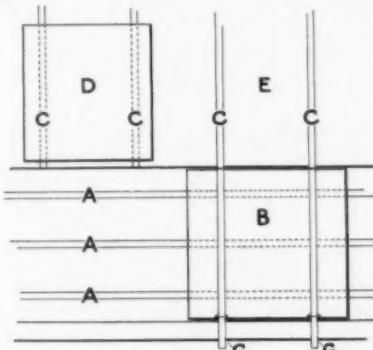


Diagram of Platform Arrangement

It was quite common for this company to receive rush orders on beds which would have to be made up immediately and shipped at once. Often the truck would be held for one or two beds which were not quite complete, thus adding to its inefficiency.

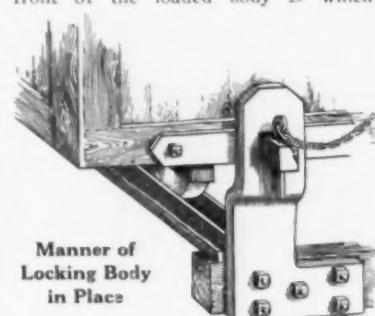
This company, however, being a progressive one, and realizing that it should be possible to use power driven vehicles to advantage, again studied the question in a systematic way, and at last decided upon a method by which the loading-time waits could be eliminated.

This is How it Was Done

Extra bodies of panel type were purchased, each of these mounted on six steel wheels of about 6 inches in diameter, with 2 inches width of rim. Just back of the front edge of the platform it was cut away for a depth of some two feet, a subfloor laid, and three channel section tracks A A A, as shown in the accompanying diagram, were laid. Upon these on suitable wheels moved the platform B in a direction parallel with the front edge of the platform. Running at right angles to the front edge of the platform, not only on this movable platform but in the floor on a level with its surface back of it in the warehouse, were tracks C C and C C.

The empty removable body is loaded while standing on the tracks at the loading

the movable platform B, and platform and body moved on the tracks C C at the point E. The platform B is then shifted over in front of the loaded body D which is



wheeled on to it, and platform B again moved over to a position where its track coincided with the steel strips which form a track on the truck chassis. It is then a platform at the position D, as shown. As soon as the truck returns after having delivered the load, the body is pushed across simple matter to push the loaded body into position on the chassis where it is locked and prevented from rolling backward by placing pins F (see accompanying sketch), there being one of these on each side, through a hole in a stud projecting from the body itself. Pins F are held by chains to the side of the front seat. This makes a securer fastening and one which can be instantly disengaged.

As soon as this system was put into operation, it was found that the work

which could be done was immediately more than doubled, and the truck became indispensable. Three more trucks, 2 three tons and 1 two ton were then purchased, the two-ton models being used with this demountable body system, four demountable bodies being employed.

A Ford car was also purchased and fitted with a specially wide commercial body, and with this, special individual deliveries, such as formerly held up the larger vehicles are made. With slight alterations the system is now working to perfection the wheels under the bodies are being replaced by ball bearing ones, which will make it possible to move the loads much easier. This was found advisable, as nearly all are capacity loads. There is a slight downward pitch from the back of the platform toward the truck, which facilitates moving the loaded bodies to the truck and does not interfere with rolling the empty bodies back.

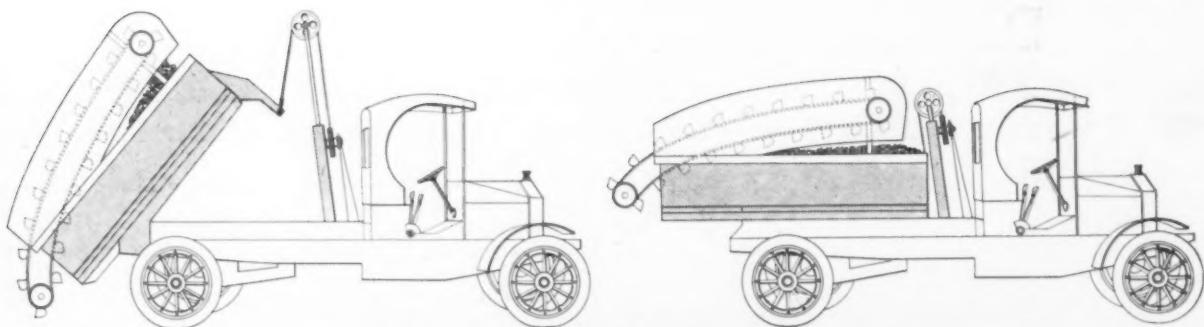
Little difficulties were encountered, but these were speedily overcome. A hinged piece of channel was arranged at the outer edge at the points G G at the front edge of the movable platform to bridge across the space to the truck guiding the wheels of the body in place. A stop with a metal edge was built on the front of the loading platform, positioning the truck chassis and preventing the end of the truck from being damaged when it backs up to the platform.

These four trucks are now displacing ten wagons and more than twenty horses, the company now using but two wagons.



Combined Truck and Traveling Crane

A Federal Truck, used by the St. Louis, Mo., Water Department, for water gates and hydrants



Link-Belt Attached Loader in Loading and Hauling Positions

NEW LINK-BELT LOADER TO BE PERMANENTLY ATTACHED TO TRUCK

Recently we described two Link-Belt loaders, these being mounted on a frame for moving on the ground; but this moving required time, money and some external motive power. While this loader would be valuable in cases where the loading piles were large and close together, their use would be not so economical where there were several small loading piles at some distance from one another.

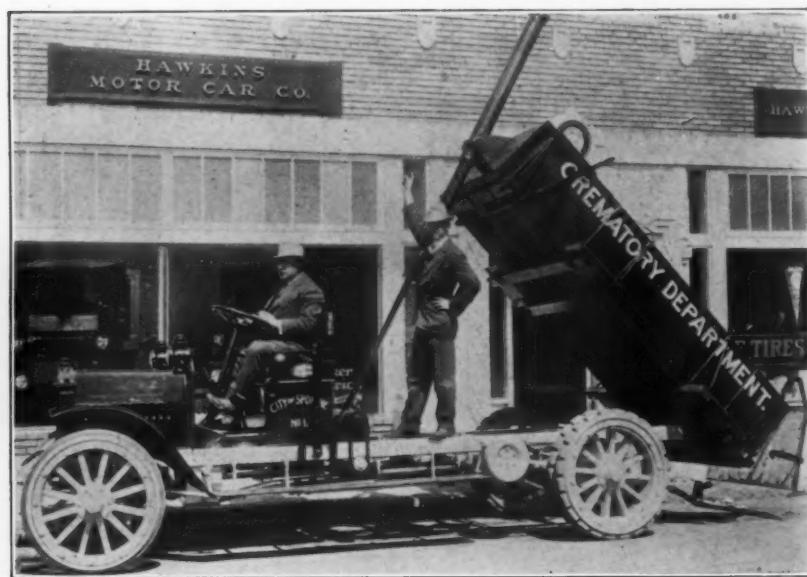
To provide for these cases, the Link-Belt Company, Philadelphia, Pa., is bringing out a loader which is to be permanently attached to a motor truck.

When loading, the truck body is hoisted, as shown in the left illustration, bringing the buckets down into operating position, the material discharged piling up in the body (the doors being closed) until filled. Lowering the body raises the elevator.

The body is dumped in the usual way by dropping the back door, the only special, so far as the body is concerned, is a slightly different arrangement of dumping doors in rear. The loader can be built complete at \$900, f. o. b. Philadelphia.



Body Used by Restaurant
It has side doors and shelves to carry pies and other pastry



Spokane's Federal Garbage Handler
The city of Spokane, Washington, employs this truck to haul garbage to the crematory.
The engine power is taken from the transmission shaft to raise the body



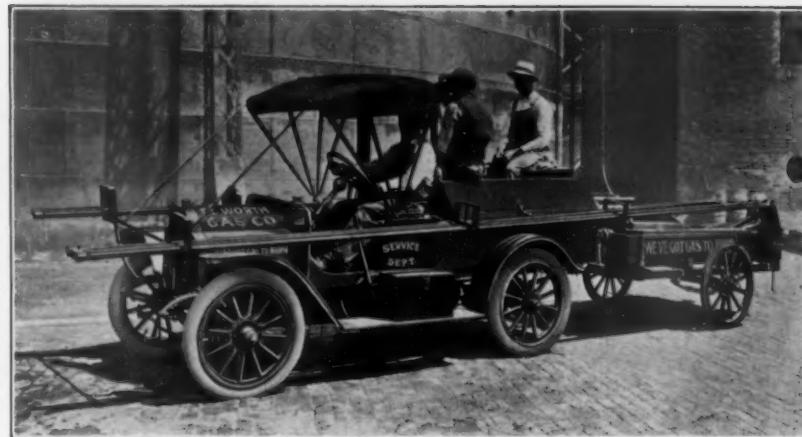
Interior of Packard Ambulance
Instead of the usual cot, a basket, mounted on rollers, as shown, is used. Metal handles are provided at the sides. The floor of the car is fitted with guides, so that the patient can be rolled gently into position. The entire interior of the car is of metal, and sanitary throughout.

HOW A TEXAS GAS COMPANY SAVED MONEY WITH COM- MERCIAL CARS

The Fort Worth Gas Company, of Fort Worth, Texas, purchased two 1000-lb. Commerce Commercial Cars in October, 1912. One of these was put into service on November 7, 1912, and the other on February 6, 1913. The first truck, a Model C, has displaced one two-horse meter wagon and one one-horse wagon and also the services of two men. The same work is taken care of, better service given and all this at a net saving of \$91.65 per month over the old method. The truck covers an average of 32.2 miles per working day with an average monthly expense for oil and gasoline of \$9.50. The mechanical expense during six months preceding April 15, 1913, was \$3.75, this being for replaing of a fiber wheel.

The Model A car, which was delivered on February 6, 1913, was equipped for service work and the total weight including weight of car, tools and men is about 3000 lbs. The car covered an average of 35 miles per day and the gasoline and oil expenses amounted to \$11.50 per month. The additional weight carried and the fact that the service work is mostly in parts of the city where there were no paved streets accounted for the difference in oil and gasoline cost. The two trucks have eliminated five horses.

For the month of September, 1913, the gas company submitted a carefully kept record of operation expense for two motor trucks as follows:



Delivery Car With Trailer; Used by Gas Company

This one thousand pound Commerce car is used by the Fort Worth, Texas, Gas Company. The trailer carries tools and is dropped at the first job. The foreman can then take the car to the next job and get it ready, transport men, etc., making double use of the time.

TRUCK NO. 1.	
Operated 22 days.	
Total mileage 535.	
1-Meter setter	\$68.20
Gasoline	9.34
Oil	1.86
Repair material	3.00
Repair labor at 75 cents per hour...	14.75
Tire expense, estimated	19.25
Orders handled 512.	\$116.40
Average cost per order 22.7 cents.	

TRUCK NO. 2.	
Operated 25 days.	
Total mileage 521.	
1-Meter setter	\$78.50
Gasoline	7.64
Oil	1.80
Repair material	2.25
Repair labor at 75 cents per hour...	19.25
Tire expense, estimated	
Orders handled 526.	\$109.44
Average cost per order 20.8 cents.	

An analysis of this table shows that the number of orders handled was 526 at an average cost per order of \$208. In the old days of horse delivery, the best the company could do was \$52 per meter order.

An extract from a letter from this gas company follows:

"On several occasions we have had one of our cars weighed when loaded and the total weight was 1500 lbs. (car not included), but we found this was not practical, so we purchased a Detroit trailer and put heavier tools on it. Our gang now starts out with the Commerce and trailer, the latter being uncoupled and left on the first job and the gang start to work. This arrangement gives our foreman the use of the car in laying out second job and transferring men and material. The trailer with the tapping machine, etc., being pulled about as desired.



A Tower Wagon Body

Street railways and power companies are large users of motor trucks in their maintenance work, and the special requirements of their routine have resulted in the development of tower trucks for repairing overhead wires, switch boxes, fuse boxes, lamps, insulators, etc. One of the most effective tower trucks is the White one and a half ton truck owned by the Yonkers Railroad Company. The tower of this truck, instead of being rigid, is telescopic and is mounted with a platform which revolves on a turntable and enables the repair crew to work in places that cannot be readily reached with rigid structure.



Vulcan Five-Ton Truck With Steel Dump Body

This truck is owned by the Wallis & Carley Company, of Akron, Ohio, and is used for hauling lumber. The dump body is elevated by a chain hoist. This body is so constructed that brick, tile, sand, gravel and cement can be handled with equal facility. The body is equipped with rollers in the bottom, permitting lumber to be dumped easily; and these rollers are so arranged that the bearings do not wear and allow the rollers to drop, consequently are close enough to the bottom of the body at all times to prevent the sand and gravel from siftiing through to the street. The truck is made by the Driggs-Seabury Ordnance Corporation, Sharon, Pa.



Water-Sprinkler Body on Autocar
Body is 350 gallons capacity and has two rear outlets operated from seat

"HOT PENETRATION" ROAD OILER

Nowhere has one seen a more unique road construction machine than the 5½-ton Hewitt "Hot Penetration" Road Oiler shown herewith, which has just been built by the International Motor Company, New York.

This motor truck is equipped with road oiling apparatus, designed for applying binders to roads in course of construction. This machine should in no way be confused with a machine for laying dust. It is a purely constructive piece of machinery for building roads, conforming with the latest ideas employed in the construction of the new trunk highways, such as the Lincoln Highway, etc.

The rock construction of road built by this machine is very similar to the old-fashioned macadam. A permanent foundation is first laid, after which large crushed stone is applied according to the road specifications. The "hot road oiler" is then run over the road, applying a hot bituminous binder, which is forced on to the crushed stone under pressure. The hot oil fills up the interstices between the stones, holding them in place. As the binder hardens the stones are held more firmly in place, forming a solid mass of crushed stone and bituminous material. When the first course is finished, another layer of stone is rolled into place, the stones coming in contact with each other by the pressure of the steam roller; again a hot binder is applied by the "hot road oiler," filling up any crevices. In this way a solid road is obtained with no openings between the stones, and no moisture can get into the road and disturb its surface when it freezes, as is frequently the case in macadam roads. The stones are gripped in the bituminous binder and all spaces filled up, so that the stones cannot be picked out by automobile traffic. Of course, a road of this type has no dust.

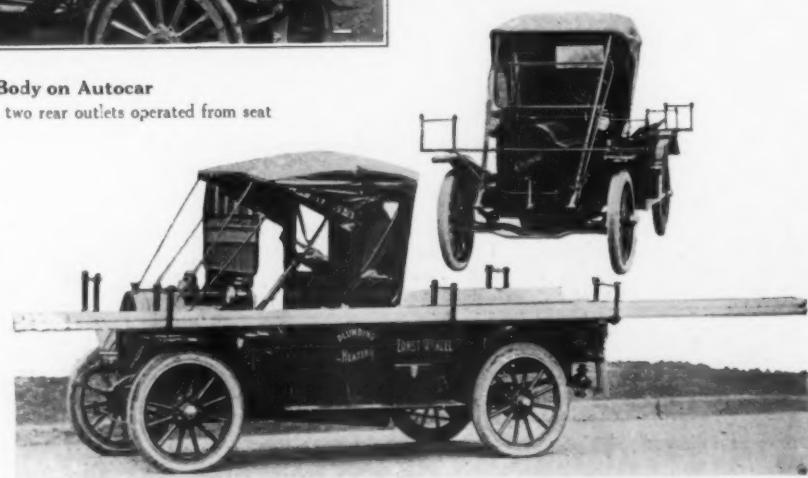
This method of road construction is known as the "penetration method," and is one of the most economical ways of building a modern road.

The large tank holds 750 gallons of binder. The binder in the tank is heated by coils of pipe in the tank, which coils are filled with steam. This steam is generated in the flash boiler at the rear of the truck.

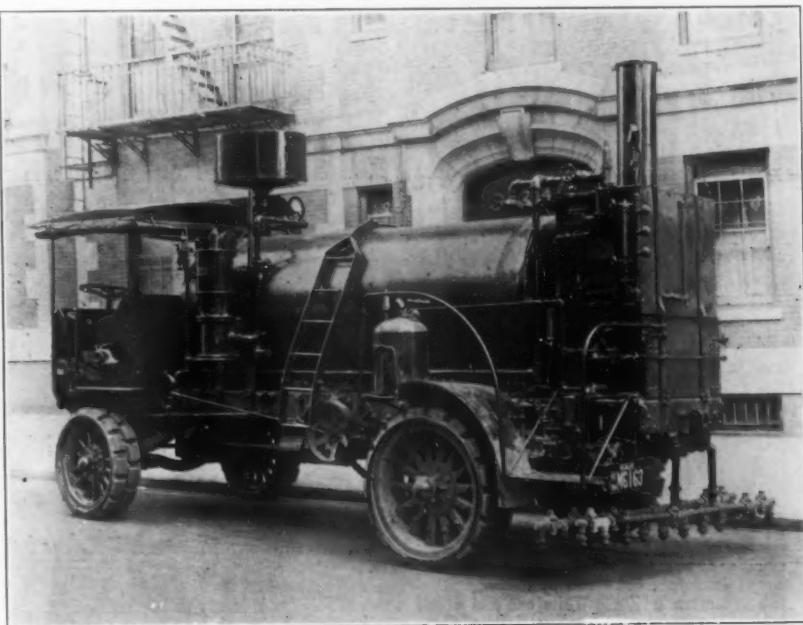
The boiler is fired by fuel oil which is carried in the upper cylindrical tank on the right side of the truck. The steam from this boiler is also used to run a reciprocating "plunger type" air compressor. The air pressure forces the binder in the large tank on to the road. The lower cylindrical tank on the right side of the truck carries the water for the boiler.

Suitable arrangements have been provided for straining the binder when it is taken from the tank, before reaching the distributing manifolds situated underneath the boiler at end of truck.

Binder can be applied at the rate of from $\frac{1}{4}$ gallon per square yard to as much as 2 gallons per square yard.



Especially Designed for Plumbers
A Commerce one thousand pound flare-board delivery car fitted with irons at the sides, for carrying lengths of pipe, rods, etc. This rigging, while somewhat novel, is extremely simple



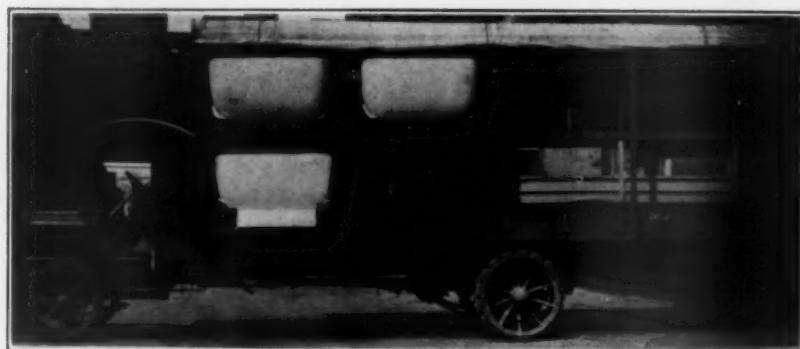
A "Hot Penetration" Road Oiler
This road oiler, which is entirely self-contained, is mounted on a Hewitt five and a half ton chassis, built by the International Motor Company

AN EXAMPLE OF EXTENSIVE USE OF TRUCKS BY LUMBERMEN

The motor equipment of Theodor Kundtz, of Cleveland, consisting of ten White heavy service trucks is a striking example of the application of motor transportation to a business which involves the handling of lumber in all its stages from the moment it is cut down in the forest until it is ready for shipment or delivery in the form of furniture, cabinets and other artistic woodwork.

While the business of this firm requires a general plan of transportation not unlike a good many other concerns which operate their own mills, factories and cabinet works, the efficiency of the Kundtz system, no doubt, is due to a large amount of experimentation and study to make a flexible system meet the needs of both ordinary and extraordinary hauling.

This was evidenced about two years ago when the company prepared a five-ton truck to enter the hardwood forest in the southern part of Cuyahoga County and bring out fine specimens which could not



Five-ton White With Special Body for Cabinets, Bodies, Etc.
Operated by Theodor Kundtz, Cleveland

be handled in the usual course of lumbering operations. While this experiment was being conducted, Mr. Kundtz was employing six three-ton trucks in the routine work of the business and these trucks proved so successful that he purchased three more trucks of five-ton capacity.

At the present time, the fleet is divided into groups which perform a distinct line of work. The three-ton trucks are used to deliver furniture to different parts of Cleveland, as well as to trail loaded lumber wagons around the extensive yards from the mill to the piles. The five-ton trucks are constantly employed to haul lumber from the lumber yard to the factory, a distance of about five miles, and it has been found that the capacity of these trucks, on an average, is between four and five round-trips per day each. According to Mr. Kundtz, one truck does the work that was formerly done by three teams.

The use of trucks in rough logging, however, is a branch of the lumber industry in which the motor truck is comparatively new. Nevertheless it has been the means of developing one branch of the industry that has suffered from expensive methods. This was brought out plainly in the work of the Kundtz logging truck.

The facility with which the truck has drawn heavy logs out of ravines 500 and 600 ft. deep, is appreciated no less than its capacity to load and haul rough logs on a heavy tonnage basis. The customary haul is approximately 5 tons for an average distance of about 6 miles. On arrival at the railroad siding the rapidity with which the truck drops its load and pulls the logs upon freight cars by the use of its power drum and cable, produces a great saving of time and labor.



Coal Wagon, Elevated Front and Rear
One man can easily raise this body, on account of the low reduction of the gear



A Truck for Fruit Growers and Nurseries
Primarily built for accommodating peach baskets, this product of the Martin Carriage Works is so constructed that the entire top may be removed so that trees can be carried

TRUCK FOR FRUIT GROWER AND NURSERY

Mounted on a 2½-ton chassis made by the Martin Carriage Works, of York, Pa., this body is constructed in three tiers, capable of holding 165 peach baskets. The bottom boards of these tiers are built in removable sections and they may be taken out as the body is unloaded. Access to the body is furnished on the side, as well as the rear, the upper screen being removable, allowing the tail gate and side gate to swing down for a loading platform.

This body is also constructed so that the whole upper part, including the top and sides can be removed, leaving an open flat for hauling trees. The body was built especially for hauling peach baskets, and is just large enough to contain the allotted number so that there is no side or end motion to the load.

A QUICK LOADING AND UNLOADING DEVICE

In the textile industry, as in many other lines of business, the idleness of trucks during periods of loading has been reduced to a minimum by loading in units such as baskets, crates, removable platforms, etc., which are usually fitted with rollers or casters to slide on and off the truck. Particularly in inter-factory work, where goods in one state of manufacture must be moved to another building for the next stage of manufacturing, the rapid transfer of material is highly essential, and the requirements of this transfer work have resulted in many interesting methods of load handling.

The 1½-ton White truck shown in the accompanying cut has a platform of unusual length to carry three castered crates. The truck platform is built up to the exact level of the shipping platform enabling two men to load or unload the truck in a few minutes, thus eliminating a congestion of material, reducing the number of handlings, cutting down the labor cost and saving a great deal of time.

AN ELEVATING COAL BODY

In an accompanying cut is shown an elevating coal body on a Pierce-Arrow chassis in use by Bunke and Meyer, New York City, for handling coal. The body is elevated by power from the engine by two vertical screws at each end, at the lower ends of which there is a worm wheel.

The distance from the ground to the highest point when in the lowest position is 7 feet 6½ inches, and when in this position the body is 36¾ inches from the ground. When the body is raised to its highest point, the bottom of the chute is 6 feet 3¾ inches from the ground, so that the body elevates 3 feet 3¾ inches, and will deliver coal on the sidewalk 40 feet from the side of the truck, or through a window 6 feet from the ground, if the truck is directly alongside of it. The body can be raised in 1 minute and 20 seconds and lowered in less time than that.



A Time Saver for Loading and Unloading

This view of one of the White trucks owned by the Arlington Mills, at Lawrence, Massachusetts, shows the advantage of loading methods which keep down idle time at the shipping platform and enable the truck user to keep the machine at work on the road.



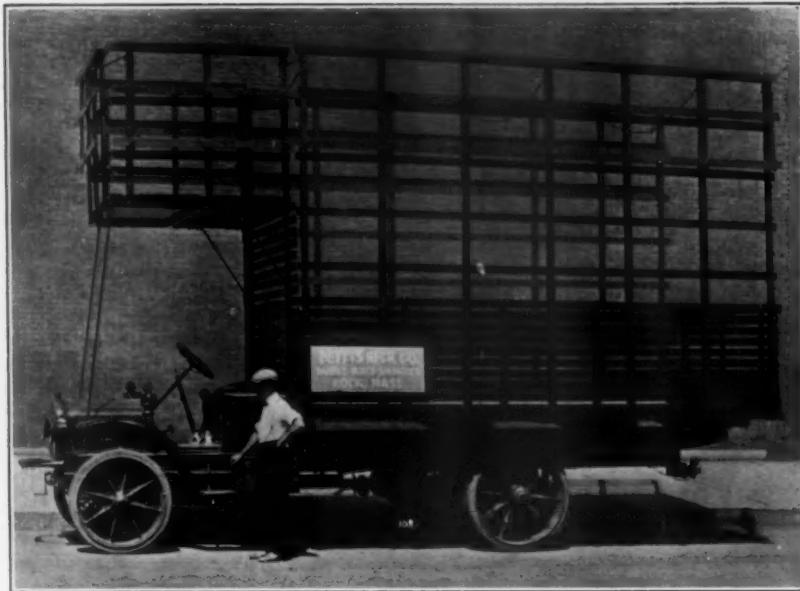
Federal With Unusual Biscuit Body

It is used by the Pacific Coast Biscuit Company, Seattle, Washington, the body being an imitation of the company's carton



A Novel Type of Elevating Coal Body

A Pierce-Arrow chassis with a coal body mounted thereon, which, instead of tipping or tilting, as is the usual case, elevates at both ends. This truck is in the service of Bunke & Meyer, New York City. One of the views shows the body being loaded, and the other, in the act of discharging



A Body for Light Bulky Loads

A five-ton White truck of the Bettys Neck Company, of Rock, Mass., illustrates the type of special body that is used to carry barrels, boxes, baskets, shingles and other material of great bulk without great weight. It will be noted that the body designer took advantage of the space above the driver's cab to give additional loading space.



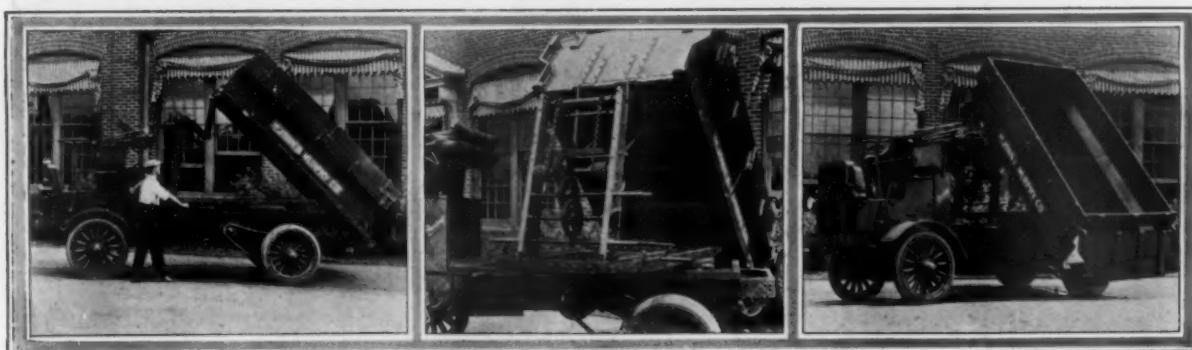
Pierce-Arrow Five-Ton Truck With Special Brick Body

The brick clamps used for loading and unloading this body are of considerable interest. The drop sides greatly facilitate this operation, and the truck is especially valuable for the delivery of face brick, etc., which must not be roughly handled.



Side and End View of Police Emergency Car

This body, built by the Brown Auto Carriage Company, of Cleveland, Ohio, was made to specifications. The right-side seat has a hinged extension which can be made into a sort of cot for injured persons or drunks. Under the seats are carried stretchers, blanket, etc., accessible through the rear. The carrying capacity of this vehicle is ten persons besides the driver.



Three-Way Dump Body on Speedwell

The different dumping positions of the body save much maneuvering, etc., especially in narrow quarters.



Nurseryman Saves by Use of Demountable Bodies

Hoopes Brothers & Thomas Company use the above demountable bodies and small trucks to save the time of its Packard. This shows how the body is run off onto the hand truck, and from another hand truck the loaded body is pushed onto the chassis. These bodies weigh but little more than the ordinary body, simply having eight wheels of small size upon which they roll.

INTERURBAN 'BUS LINE

A new type of Interurban Automobile Passenger Car has just been turned out from the shop of Alexander Christie, of Seattle, for the Tacoma Transit Company, of Tacoma, Wash.

There are four of the cars, three of them having already been put into commission on a run from Tacoma to Puyallup and Sumner, a distance of 11 miles. The cars are paralleling an electric line operating between the same places and are averaging a passenger traffic of over one thousand people a day.

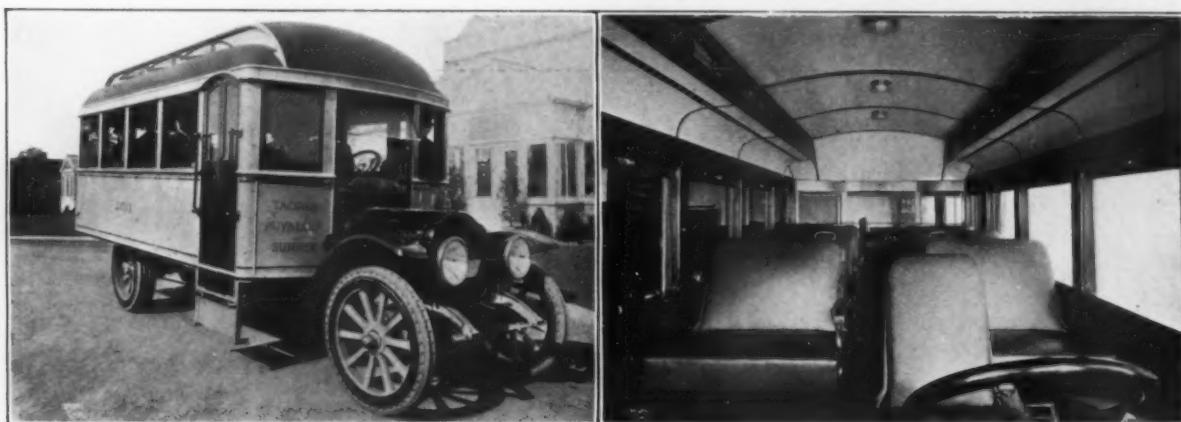
As will be seen by the accompanying cut the cars are exceedingly attractive as to exterior and interior. The bodies are of the street car, pay-as-you-enter, side door type, with full colonial top. The paneled sides are of steel and the floor bed carries 4-in. I beams. A heavy steel band encircles the entire frame making the body exceptionally rigid.

The interior is finished in mahogany with nickel plated trimmings throughout. Eight side seats placed similar to those in street cars with an aisle down the center, one seat extending across the back and one



Pierce-Arrow Five-Ton Truck With Dump Body for Builders' Materials and Special Provision for Carrying Concrete Blocks

Showing truck after dropping load of concrete blocks. For sand, gravel and other building material. The hydraulic hoist shown just behind the driver's cab is used for dumping



Interior and Exterior Views of Motor 'Bus

This body is built on a White chassis and is used by the Tacoma Transit Company. It seats twenty-three persons, not including the driver. The driver also acts as conductor

short side seat near the front give a seating capacity of twenty-three people exclusive of the driver.

The driver by means of a lever operates the doors and step with one motion. He also acts as conductor, as the front door on the right side is the only means of entering or leaving the car.

The cars are roughly 15 ft. by 7 ft., 6 in. by 6 ft. 6 in. inside.

A DENVER BISCUIT TRUCK

A novel adaptation of the "silent salesman" and direct merchandising principle has been employed in the body design of a White 1500-lb. truck owned by the Merchants Biscuit Company, of Denver, Col. This truck might truthfully be called a traveling biscuit store.

Much the same as the rural butcher would show his meats and then sell the particular cut which a customer preferred, the biscuit company's truck silently displays the full line of biscuits and the grocer or other customer may buy or order

just what he prefers or needs without any handling of stock until a choice has been made.

On each side of the truck body there are three shelves containing twenty-four of the customary-sized cracker boxes, held in position by latches. Being built outside and above the usual limits of loading space, the shelves do not limit the size of load that can be carried. The body therefore permits the carrying of a full sample line, the direct selling of goods, and still retains most of its capacity for delivery work.

President C. A. Bowman states that the truck has been used constantly under the most adverse conditions, yet in the first year the speedometer has shown a record of 9000 miles. Mr. Bowman says that in his opinion the White engine as well as the general construction of the machine is the best yet offered from the standpoint of service and durability.

"We are proud to state," said Mr. Bowman, "that fifty cents is the total amount expended for repairs on the engine up to this time."



A Silent Salesman

A Denver, Colorado, biscuit company uses this method of marketing its products. It is in reality a traveling biscuit store.



Packard Truck With Special Long Body for Pipe Carrying

McArdle & Cooney have been using the above Packard truck for a year and a half in the delivery of pipes and material to buildings in process of erection. It has taken the place of three teams. The body measures 18 ft. in the clear, back of the front seat, and pipes of great length can be carried by letting them extend over the back.

NOVEL SIDE-DUMPING BODY

A body which should interest contractors who have sand, trap rock and heavy stone to handle, has been designed and patented by the Metropolitan Auto & Carriage Company, Bridgeport, Conn. This type of body is shown in the accompanying illustration. It has a maximum capacity of 224 cu. ft., and has a truss 21 in. high, running the entire length at the center of the body. From the top of this there are two steel covered planes which slope downward and outward to the outside edges of the truck platform at an angle of 45 degrees.

The sides of the body are made of three separate steel lined gates hinged at the top to a 1 3/4-in. iron pipe. Close to the driver's seat is a handle operating a rod to which are attached the arms which keep the sides of the body closed. When this handle is released the weight of the load springs the gates outward and the entire contents discharge itself. This can be done from the driver's seat with the truck in operation, if desired. The dimensions are 12 ft. long, 6 ft. wide, sides 36 in. high.



Rapid Side-Dump

Either side can be dumped separately by merely releasing a handle, which can be done from the driver's seat.

MERCURY TRUCKS EFFECT SAVING FOR VACUUM CLEANERS

By the use of a Mercury truck fitted with a well-known vacuum equipment, H. C. Sheffers, likewise Mr. Otto Elling and others have made a great saving in transporting their equipment to job, and still greater in operating their pumps.

By a very simple arrangement, the pumps are operated by motor in truck while standing in front of house where cleaning is being done. By the loosening of one set screw, the motor in car is changed from truck motor to pump motor. The connection is made at the universal joint. This joint is of a special design, and is made so that it requires no attention whatever, and will last for years. It consists of two flanges, one being connected to tail shaft of transmission and the other to jack shaft, being held to each shaft by means of steel key and set screws. The front flange is substituted by a sprocket flange in the above equipment. To transfer power from jack shaft to pumps, the set screw holding rear flange in position must be loosened, and flange pushed back about 1 in. over jack shaft thereby disconnecting.

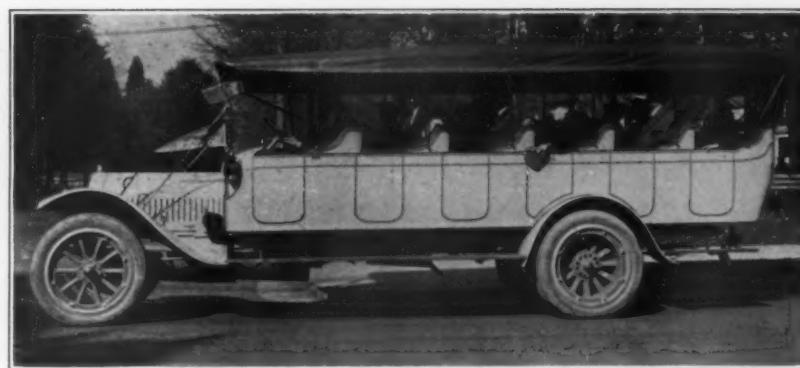
By means of a chain, power is carried from sprocket to idler shaft, fastened to floor of car immediately above, and to right in line with universal joint.

Idler shaft has pulley designed for V-belt, likewise pulley on pumps. Power is transmitted to idler shaft at all times, whether universal is connected or not, and by means of a clutch on idler, which is a special design, power is transmitted to and cut off from pumps.

Speed of pumps is regulated through transmission of car, same having two speeds, low and high. Pumps have a capacity of 40 cu. ft. per minute at an engine speed of 500 revolutions on high gear.

Mr. Sheffers is very enthusiastic over his equipment and says:

"My equipment meets with my entire satisfaction, and the more I use it the more satisfied I am. I am out with my machine



A White Omnibus

The White motor bus of Frank Shepard, of Portland, Oregon, which is built with six rows of heavily upholstered seats and along the lines of a touring car. It is mounted on a White one and a half ton chassis with a six-cylinder sixty horse-power motor. A standard type of automobile top is also used, retaining another of the characteristics of the touring car which are seldom found in omnibus construction. This machine furnishes comfortable seats for twenty-four passengers.



A Boston Lumber Truck

The Downs Lumber Company, of Boston, is one of the prominent New England lumber companies who are using motor trucks to advantage. The company owns two White trucks of one and a half tons capacity, on which light lumber is hauled in the characteristic New England style, the load being carried on a slant, with the front end resting on a cradle above the driver's head, and the rear on the end of the platform body. These types of bodies are suitable for use in connection with portable loading platforms, idlers, etc.; they also simplify the work of picking up a load that is scattered about the yard. When idlers are used the transfer of an entire load from the idler to the truck can be made in a few minutes.

from $\frac{1}{2}$ to 4 hours at a time. The consumption of oil and gasoline is no greater than in ordinary use, and that is exceedingly low. I purchased this machine February, 1913. It has paid for itself already, and should 1914 spring business show good results I shall put on another."

The above shows that there is a demand for the commercial car in every business, and its value to the merchants in general is gradually being realized by them. The experience of Mr. Sheffers is typical of a number of others who have found the commercial car of sudden importance.

ELECTRICS IN NEW ENGLAND

There have been a number of notable additions to the motor truck fleets of New England. Those creating the most interest in Boston are the first three of a fleet of G. V. Electric trucks for use on the new fish pier at South Boston. These machines are of 5-ton capacity and are provided



Two Vacuum Cleaning Trucks

Two Mercury commercial cars which carry vacuum cleaning outfits, the power for operating the pumps being supplied by the motor of the car by a special construction

with electrically driven dumping bodies. These machines are designed for carrying cracked ice from the great ice plant at the head of the pier to the fishing boats that are moored beside the pier. The trucks run down the wharf and turn so that the back of the bodies overhang the wharf and side of vessels. An electric switch is thrown and in one minute the body is raised and the ice slides out and down into the hold of the vessel. A reversal of the switch lowers the body and with the least possible effort on the part of the operator the 5 tons of ice have been delivered and the machine is returned to the ice plant for another load. Six of these automatic G. V. Electrics will take the place of eighteen to twenty of the ordinary form of lumbering ice carts.

These electric trucks are charged at the electric station on the pier. On account of the incompletely appliances for handling coal these new electrics are meeting the emergency by hauling loads of coal. The automatic electric dumping bodies making an exceptionally rapid way of handling the coal at the station.

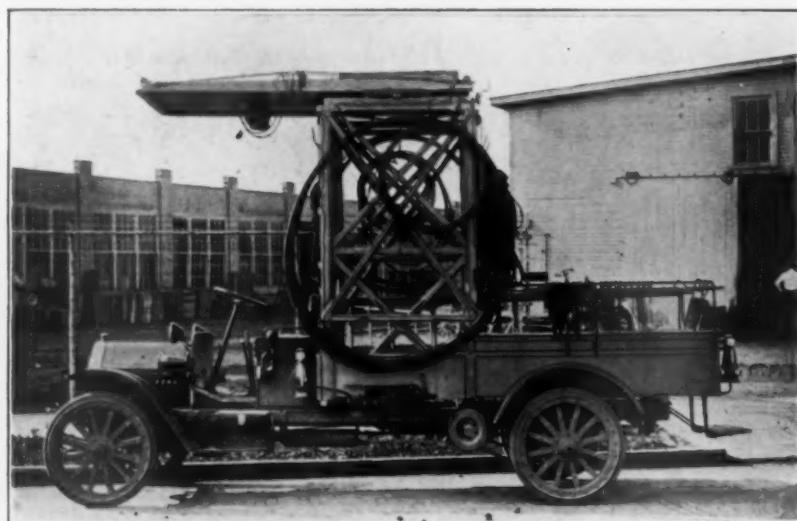
Another truck installed recently is a machine for the delivery of sugar by the American Sugar Refining Company. This machine has the largest body of any truck in Boston and is capable of carrying 5 to 7 tons of sugar. This machine will be seen delivering sugar around Boston and suburbs.

New Bedford is to have a number of additions to its motor truck fleet this month, the principal companies adopting the motor vehicle are the New Bedford Gas & Edison Light Company, The Pairpoint Corporation and the J. V. Spare Dry Goods Company. The lighting company is already operating ten electric business wagons; The Pairpoint Corporation is adopting the 3½-ton G. V. Electric heavy duty trucks, while the J. V. Spare Company is putting on some electric wagons of the light type, especially designed for department store delivery.



Pierce-Arrow Five-Ton Truck With Triple-Purpose Body

To build a body capable of hauling the varied products handled by the United Fuel & Supply Company is no small problem. This body is adapted to haul sand, hard and soft coal, and coke, as well as a large variety of building, paving and sewer supplies. The removable auxiliary flareboards permit a full load of coke to be carried; the steel body itself takes a five-ton load of coal, while a line around the inside of the body marks the maximum load of sand.



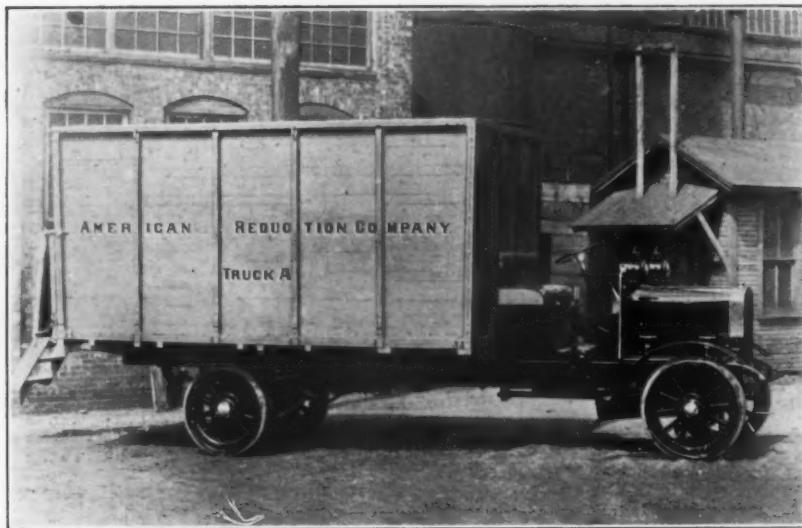
A Tower Body Commercial Car

One of the Federal Trucks used by the Detroit United Railways in the Line Maintenance Department



Pierce-Arrow Five-Ton Truck With Special Lumber Body

A very popular type of lumber body. The load is piled on skids and placed on the truck by means of a crane. At the point of delivery, the load is rolled off the platform by means of the levers shown at the rear.



A Three-Ton Vulcan Truck Fitted With Special Body for Gathering Waste Paper

Made by the Driggs-Seabury Ordnance Corporation, Sharon, Pa., and used by a Pittsburgh firm for carting waste paper from various office buildings

A CHASE LUMBER TRUCK

The illustration shows the ease with which three tons of lumber are unloaded at one time by one man, who simply turns the hand crank, which revolves the rollers causing the load to travel to the rear until it overbalances. When the rear end rests on the ground the operator drives the truck from under.

The device is very simple and powerful. For instance, in bringing the rear end of the load in contact with a building or other firmly fixed object turning the crank-roller device will drive the truck from under the load.

Note, that the stakes rest in loops attached to the truck frame. The unloading device with its frame forms the floor of the body. This can be readily removed and a platform substituted when other material is to be hauled.

For the quick loading of lumber a similar roller device is placed on frames or horses slightly higher than the loading platform of the truck. It is a simple matter then to transfer the load in the same way.



An Hydraulically Operated Dumping Body

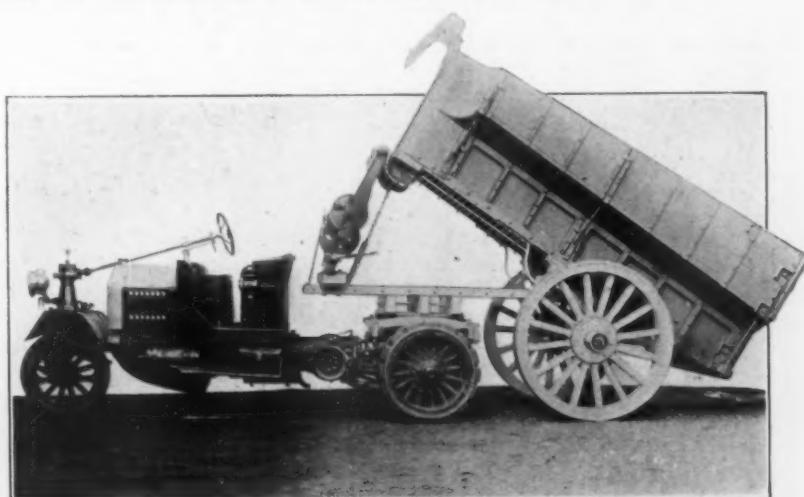
Mounted on a five-ton B. A. Gramm's chassis. This truck has a capacity of 110 cu. ft. of stone or sand. The entire dumping operation, from raising the body, unloading it and returning it to its normal position, is completed in thirty seconds

B. A. GRAMM'S HYDRAULIC DUMP TRUCK

The accompanying illustration shows one of B. A. Gramm's 5-ton motor trucks fitted with a hydraulic dump body in running and dumping positions.

A rather striking example of the savings which these trucks can accomplish is furnished by the experience of a stone quarry in Lima, Ohio, which used this particular truck as a trial for a few days. This firm figured the machine did in about $3\frac{1}{2}$ hours the same work that they could formally accomplish with their teams in 15 hours, and that their saving in doing this work by means of the truck in the shorter time was about \$16. The cost of delivering a yard of stone with such a machine is frequently as low as \$12 $\frac{1}{2}$ against an approximate average of from \$40 to \$50 with horse and wagon.

Oil is the medium used in the cylinder. A gear pump driven from the propeller shaft controls the forcing in of the oil into the cylinder and operates the piston therein. At the end of the shaft attached to the piston will be noticed two sheaves over which the cables operate which lift the body.



Knox-Martin Tractor With Dumping Body

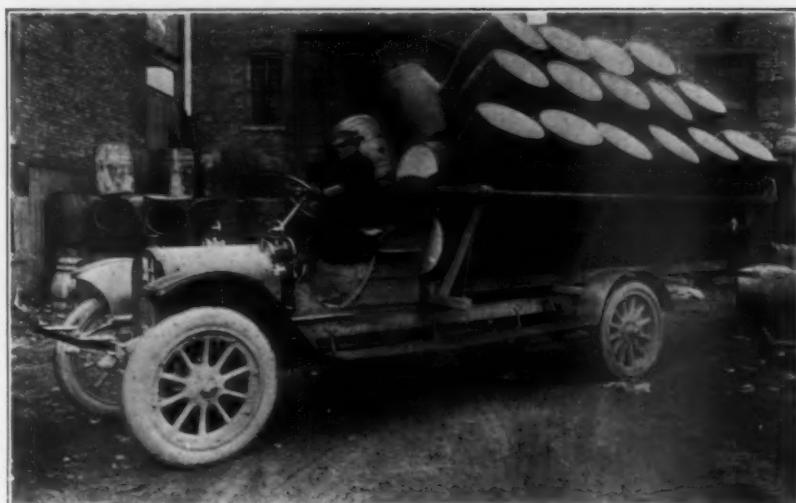
A special type of dumping body for coal, gravel, crushed rock, etc., designed for use with a Knox-Martin tractor. The dumping mechanism is of the gear type, of powerful construction and leverage, and the body tips to an angle where a clean discharge is effected, so that there will be no drag and no tendency to lift the front of the vehicle.

A LARGE BODY FOR A LIGHT LOAD

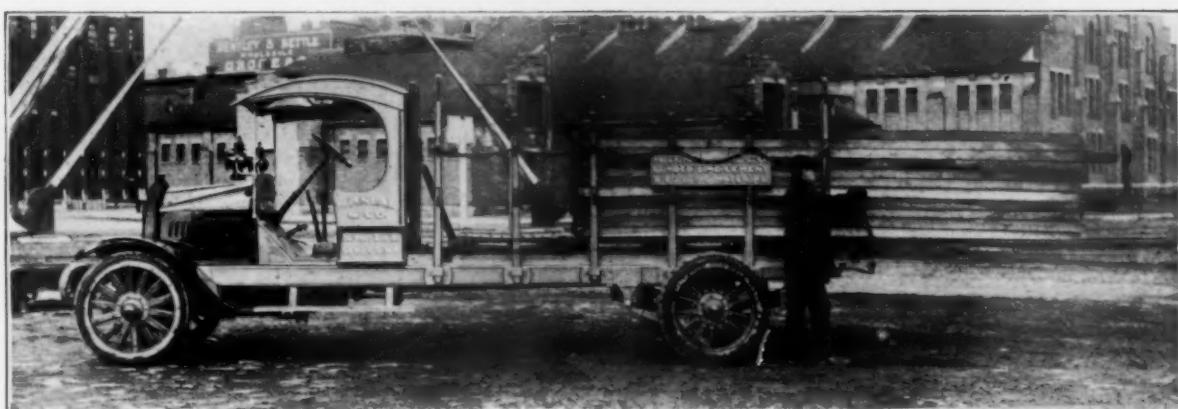
Cartage is a work of the utmost importance in the cooperage business and the motor truck has become almost indispensable to the large establishment mainly because of its capacity for handling large loads more rapidly than horses. The cooperage business requires not only the delivery of the re-coopered barrels and kegs, but before they are steamed, cleaned, repaired and resold, the company must collect them from many different sources. The incoming stock of barrels always has about the same weight and bulk as those which are repaired and, unlike most hauling propositions, the methods of receiving and shipping are almost identical.

To carry a capacity load on their White 1½-ton truck, the Chicago Cooperage Company built a special body having an outrigger side rail. This supports a larger load than could be carried on a standard job.

Robert O. Pritchard, proprietor of the business says the one truck easily does all the work that two teams could do and



A Cooperage Truck
Used by a Chicago concern, the body having an outrigger side rail



A Special Body for Handling Lumber

The Chase worm-driven three-tonner, with special body and quick loading and unloading device, in the service of M. P. Neal & Company, of Oswego, N. Y.



Budd "Thermos" Hot-Asphalt Body on Locomobile

The steel body is doubled-walled, with a dead air space, thus preventing radiation of the asphalt's heat

that the company could not do one-half of its present business without it. The truck has averaged 50 miles a day for the past year and a half.

BUDD ALL-STEEL BODIES

Believing that steel bodies give the greatest strength, durability and appearance, the Edward G. Budd Manufacturing Company, Philadelphia, Pa., has specialized this type of body and recently introduced a new "Thermos" all steel body for handling hot asphalt.

This body is double walled, with dead air space between the two shells, which are kept apart by proper insulating strips so that there is no metallic connection between the inner and outer shell, thus preventing radiation. A number of these bodies are now in use and have proved most satisfactory; in fact, temperature tests have been made at points of loading and points of discharge, with a distance between of from 10 to 20 miles, without a perceptible difference. The asphalt will slide freely from the body, leaving the inner surface smooth and slippery, as no hardening takes place, due to the inner shell being kept hot.



One and a Half Ton White Truck Owned by J. & L. Stadler, of Cleveland

Used chiefly for the removal of horses, which die in great numbers in summer, and those which are destroyed because of injuries. The truck is fitted with a simple hand winch and carries a set of skids, having rollers, on which the horses are drawn up to the platform of the truck.



Unique Loading Method Saves Time

This illustrates the dummy wagons used by the Curtis & Pope Lumber Company, of Boston, Mass., and shows the ease with which a capacity load can be transferred from the dummy wagon to the Packard truck, by a single operator. The ratchet lever, operated by means of chains which are wound up at the front and rear of the truck, slide the loaded body into place on metal-shod beams, provided for the purpose. No time whatever is lost by the truck in standing.

NEW FIELD STEPLESS 'BUS

The Field Omnibus Company, New York City, in co-operation with the engineers of the New York Motor Bus Company with whom it has a contract, has developed a stepless type of omnibus for public service transportation.

There is no doubt that the double-deck type will be more popular with the public than the single-deck type except in extreme weather conditions. The chief objection and impediment to the ordinary type of double-deck bus is the existence of the trolley wires overhead which make it difficult to operate under with the ordinary type of bus.

This Edison Storage Battery type of Stepless Bus, as developed by the Field Omnibus Company, has all the advantages of the stepless trolley cars with a greater independence of movement and is of such a low height that it can operate with safety in cities where there are overhead trolley wires, viaduct or elevated structures.

The type as here illustrated seats thirty-eight passengers, eighteen on the lower deck and twenty on the upper deck. It is 20 ft. 10 in. over all, height of step from the ground into car, 12½ in., height of car roof from ground, 7 ft. 8 in., which is 2 ft. 3 inch lower than the London, Paris and New York double-deck buses. This bus is practically five feet shorter than the present type of double-deck bus in use. It is of all-steel, stepless body construction.



Field Double-Deck Omnibus With Storage Batteries



Pierce-Arrow Five-Ton Truck With Special Maltsters' Body

The steel bodies with which the two 17 ft. wheelbase 5 ton Pierce-Arrow trucks owned by the Meyer Malting Company are equipped were built in the Pierce-Arrow factory. They are of 360 cu. ft. capacity and are designed to carry five tons of grain, malt or similar material.

A NOVEL BANKING CAR

The adaptability of the motor truck and its unlimited field of usefulness in every branch of business has seldom been more forcibly exemplified than by the First Mortgage Guarantee and Trust Company of Philadelphia, when this company purchased a White 1½-ton chassis.

The purpose was to obviate the long-established custom of theatres, merchants, etc., to lock up their receipts in a safe over night or, to carry large sums of money through streets at a late hour of the night for deposit in night banks, which even now are maintained only in large municipalities.

The Philadelphia banking institution believed that a motor-propelled bank, properly constructed, would do away with difficulties that have presented themselves for years. It required considerable planning to construct a body that would meet every requirement and be properly safeguarded. First of all it had to be of all-steel construction, making it bullet-proof, and so designed as to meet every requisite of the modern banking house. Such a body was built. While the body is of bullet-proof steel, it does not begin to tell the features which make this vehicle as fully protected as a government vault. On either side and in the rear there are windows protected by steel bars. On the right side there is a door with a combination lock. A double lock is used for egress and ingress by the cashier. All windows, as well as the doors, are equipped with a burglar alarm system connected to a 30-in. electric gong installed on the ceiling of the "bank."

In addition, there is an electric push-button with which the cashier with one touch can lower steel curtains at all windows. Also, by the touch of another button he may throw off the switch thus stopping the car from the inside in the event of accident or other emergency that might befall the driver. All of these electrical attachments are operated by the White Electrical Starting and Lighting System.

The interior of the wagon is in keeping with regulation banking equipment—safe, desk, chairs, etc.



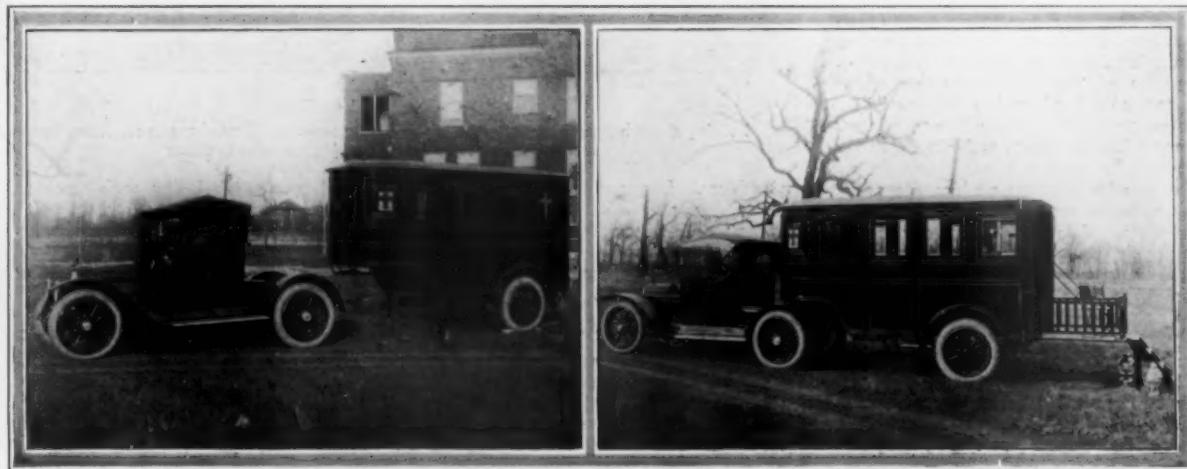
Armored Bank Wagon

Used principally for night collections from theaters, etc.



The "Autocressen," A Moving Store

This is, in fact, a delicatessen shop on wheels and is operated by William Goldstein, of St. Louis, Mo. The body is mounted on a B. A. Gramm chassis, and covers a regular route from house to house and fills its orders from the stock carried in the machine. It is, in every sense, a moving store which comes to the customer's door with its complete stock for inspection.



Chapel Car "St. Joseph," On Velie Roadster

This unusual body, drawn by the Velie Roadster, is used by the Catholic Church Extension Society of America, in localities where no churches exist. The body was built by Jacob Press Sons, of Chicago

Motor Trucks Discussed From a Practical Point of View

The Accomplishments of a Western New York Sand and Gravel Company

By D. HYMAN, Vice President, Empire Limestone Company

EDITOR'S NOTE:—It is unusual for a large user to formulate the reasons for his success with trucks, and give his methods of figuring costs; for this reason the following article by Mr. D. Hyman, who is himself a user, should be of the greatest value and interest to other truck users.



IN SUBMITTING our views on the subject of retail and wholesale deliveries of sand and gravel to the trade, I desire the readers of this article to remember that it is written by one who has paid in dollars and cents for the experience herein set forth. Like a great many others, we were for years standing on the banks of doubt before we plunged into what many over-conservative business concerns even to-day consider a costly swim in icy waters. It should also be remembered that local conditions vary, the methods of handling business differ, and so must the point of view.

Unlike most truck owners we claim a unique distinction in the fact that we purchased our trucks rather than had them sold to us. By this we do not wish to belittle the aggressiveness of the kind gentleman who sold us the trucks, but we rather feel that we ourselves realized the advantages and possibilities of motor equipment in our line of business several years before we actually began their use.

Teams Most Expensive When Most Needed

By experience we knew that July and August demanded big yardage. We also knew our horse-equipment was least efficient in those hot months when we were most heavily pressed. We also realized December and January were months to be dreaded for making deliveries, and any number of our contracts call for winter supplies. When we needed teams outside our own, a great many others were placed in the same position, so based on the law of supply and demand we had to pay good prices for hired teams and then at times could not get them. Our teams had their limitations, and we could not extend their capacity of travel. The number of units in teams is hard to handle, unreliable at times, and all owners will appreciate the many other handicaps and shortcomings of teams.

In our business we could use a pen and ink to write our letters, but we prefer a typewriter. We could carry our messages of appointments, etc., but we find the telephone more speedy and satisfactory. These conveniences are now so generally accepted, their efficiency is sometimes overlooked. It is practically manual labor versus machinery, and this view created in our minds a desire to improve in our delivery equipment if we could find a satisfactory substitute for horses, or an improvement.

The Seed Planted

Away back in 1905 or 1906 I saw in New York a clumsy brute of a truck carrying at least six yards of material. Whether the novelty of the truck itself, the terrific

clanking noise it made, or the snail-like pace attracted my greatest attention I do not know. But I do know it lit the spark of a desire to use trucks, which I felt solved for the future our main troubles. This crude piece of mechanism I knew would have to be refined like all other machinery, and I felt that in a few years it would be a practical thing for operating purposes.

From 1906 to 1910 we spent much time investigating trucks, who made them, how they were made, how much they would cost to run, and how the other fellow operated them. I remember calling on one engineer who carefully explained his chassis, but when I asked him about the body for carrying the load he shrugged his

knew, without having to experiment with trucks, that oil and grease are cheap, when compared with break-downs and replacements of parts through lack of lubrication. Our clam shells, locomotive cranes, and similar equipment need ample oiling and greasing, and careful watching for loose nuts and bolts. A motor truck being of the same class, we issued instructions for the same careful method to be followed, believing from an advertising point of view that trucks should be washed at least weekly. From a self-respecting point of ownership, no one wants a dirty looking, noisy truck on the streets. We all cater for good will, so why antagonize it? To give the men a proper opportunity to wash



One-Minute Loading
Loading at the hopper is accomplished in about sixty seconds. These hoppers are steam-heated and wood-lined to prevent freezing of material in winter

shoulders. It amused me at the time for the reason that a chassis is quite useless in itself—but since then I have noticed the engineer in question has taken deep interest in this important particular, appreciating that a chassis and body makes the unit.

Teamster Becomes Driver

In August, 1911, our first Pierce-Arrow truck was delivered. We selected as driver one of our most intelligent teamsters. He was carefully instructed how to drive the truck, thoroughly wash, oil and grease it. He was more thoroughly taught on what to leave alone, because we never hope to have drivers capable of making fine adjustments. We left that as part of the service to be rendered by the makers. We

the trucks, a half day each week is set aside whether we are busy or not. No truck leaves our garage at any time unless in efficient condition, well oiled and greased. We insist on this:—disobedience means dismissal.

Steam-Heated Wood-Lined Hoppers

"Keep it moving" is the general slogan. "The higher the mileage the greater the profit," and in all cases this is quite true. We have erected two steel hoppers, each divided into three partitions holding seventy yards each of sand, gravel or grit as the requirements may be. These hoppers are steam-piped and wood lined and we have no trouble with frozen material in winter. The hoppers are loaded by the

clam shell and all trucks are loaded at the hoppers; it takes about one minute to load. When rushed to capacity by outside teams, we sometimes use the shell to load the trucks direct, avoiding delay and confusion at the hoppers.

Unloading is quite as important in point of time as loading. We use an all steel body holding three cubic yards, or five tons. The load is discharged by the body elevating at an angle sufficient to discharge the load without shoveling. The means for lifting the body is a hydraulic hoist on the cylinder ram principle, simple, economical and reliable. We discharge a load in 30 seconds time. It will be seen that we lose very little time in loading and unloading, and the time involved in working out these two important angles will pay anyone to observe.

No Overloading

Our trucks are rated at 10,000 lbs. capacity and we do not overload them. By actual experience we do not think it economical or good business to tax any of our machinery to the limit, always having a factor of safety, and our conclusions in this particular are justified by our maintenance costs. We could probably carry greater loads, but we are not looking at results for a day. Our first truck delivered nearly 3 years ago is as efficient and reliable to-day as the new truck delivered last month. We know the temptations to overload, but we also know the results in the end, and we prefer not to pay the penalty.

Driver Dismissed if Governor is Queered

Overspeeding is as bad as overloading. Our engines are equipped with governors, limiting the speed to about 14 m.p.h. Of course, these governors can be disconnected and tampered with, but our frequent inspections would reveal that fact and the driver would be dismissed. From our point of view, this abuse is corrected by education and discipline. Hitting car tracks at top speed, harshly applying brakes and carelessness can be stopped by the supervision of the owner. A driver may do it



A Clean Delivery in Thirty Seconds
Body, when elevated, cleans the load. No shoveling required. Time required, thirty seconds

once, but after an explanation and a reprimand he won't be apt to do it again.

"What does it cost?" is an important question, and strange as it may seem, those most interested in this topic before they buy, after owning a truck appear to lose interest in the cost and when monthly or yearly statements are made, are ignorant of what it actually costs to deliver their material. From the start we have kept a detailed and accurate record of mileage, yardage and all costs to handle. These figures are kept for each one of our four trucks. Any one truck that may decrease in its earnings is easily corrected if the owner will keep in close touch with the transportation end of his business.

Complete Performance and Cost Records

As a basis for comparison we have taken July and January, representing as they do the two extremes of weather conditions.



Clam-Shell Loading

Loading with clam-shell is very convenient when other trucks and teams congest the hoppers

July, 1913.	26.
Number of actual working days	26.
Total loads delivered in tons	1516.25
Total loads delivered in yards	947.
Average tonnage per day	58.3
Average yardage per day	36.4
Total mileage covered	2169.
Average daily mileage	83.4
Miles per gallon gasoline	4.49
Miles per gallon oil	207.
Total number of loads	317.
Average number loads per day	12.2
Average round trip haul	6.8
Total expense for month	\$491.45
Total expense per day	\$18.90

January, 1914.	29.
Number of actual working days	29.
Total loads delivered in tons	1906.3
Total loads delivered in yards	1188.
Average tonnage per day	65.7
Average yardage per day	40.9
Total mileage covered	2182.
Average daily mileage	75.2
Miles per gallon gasoline	3.73
Miles per gallon oil	272.
Total number of loads	398.
Average number loads per day	13.7
Average round trip haul	5.5
Total expense per month	\$517.00
Total expense per day	\$17.82

In making up our costs we believe that we include everything essential. As a fixed or overhead charge we consider the following items and they remain the same whether the trucks operate one mile per day or fifty miles.

Fixed Charges.

- (1) Interest on investment.
- (2) Insurance.
- (3) Driver's salary.
- (4) Garage rental allowance.

These items are so clear they really require no comment or explanation to be thoroughly understood by any one.

There are variable values, however, in addition to the above that we call Operating Charges, and these increase or decrease absolutely according to the mileage covered. These are essentially as follows:

Operating Charges.

- A—Tires.
- B—Gasoline.
- C—Motor oil.
- D—Miscellaneous lubrication.
- E—Repairs and overhaul.
- F—Depreciation.



A Truck Contrasted With Equivalent Equipment

One five-ton dump truck, carrying three yards of material, does the work of four teams, each carrying two yards of material. The greater speed of the truck equalizes the amount hauled by the two equipments in the same period of time. The cost is also less.

How Tires Are Figured

"A"—We charge tires at 5 cents per mile, this being based on the cost of a complete set of tires divided by the mileage guarantee of 7,000 miles. In our three years' experience we have had to ask for but three adjustments on tires. We go over the guarantee nearly every time. We have had as high as 13,000 miles on the rear tires many times, and as high as 21,000 miles on the front tires. But we charge tires on the guarantee basis, and any excess mileage received, we credit to our contingent fund.

"B," "C" and "D"—These fuels, of course, are charged against the trucks according to the market price of these commodities. We use high grade oil and gasoline, and don't believe in cheap stuff even at a lower price.

Repairs Charged by the Mile

"E"—Probably this question of repairs has proven to be as great a bug-bear to buyers and owners as any other one thing. This is almost entirely in the hands of the user. The cost in this particular is high or low according to how intelligently the trucks are used, provided of course, a good truck is used in the first place. We charge repairs at $3\frac{1}{2}$ cents per mile and we know we are safe. Take during the month of January, we ran 2182 miles and we charged \$76.37 as against repairs, while during that month we had none. At the same time, by this method we shall have a sinking fund available when the truck must be overhauled and repainted. We know no better system than this, and in view of our experience, we feel satisfied with this arrangement.

Depreciation Also by the Mile

"D"—Depreciation. How many times has been asked the question "What should be charged off for depreciation?" Frankly we don't know. The makers of our trucks ought to be able to help us and they say the truck will operate efficiently for about 100,000 miles. Having run our first truck for 63,200 miles to date and knowing it to be just as good for that distance again we are inclined to think perhaps the makers are over-conservative. But we take their word for 100,000 miles and charge $4\frac{1}{2}$ cents per mile, and to again illustrate in January

when we ran 2182 miles we charged off \$98.19 to depreciation. Again in this case, it will be observed we use a mileage basis, and from our point of view it seems manifestly correct to figure a truck depreciating more at 100 miles per day than 50 miles per day. Of course, a percentage basis per annum at an arbitrary figure could be assumed, but we hardly feel it warranted in view of the conditions. The fear of a truck becoming obsolescent need not be great if a high grade truck is purchased, one embodying modern and accepted features of construction.

In conclusion it might be recognized as a fact that there have been many failures on the part of men in our business and other lines trying to use trucks. Don't blame the truck entirely. A man can fail in anything if he makes up his mind to do so. He can also be reasonably sure to succeed with trucks if he will equip to use them, and put a little thought and energy back of the effort. To the latter class the results will be highly gratifying and profitable.

'BUS LINE BETWEEN WASHINGTON AND BRANDYWINE, MD.

Charles Semmes has inaugurated a new bus line between Washington and Brandywine, Md. He has placed in service three large cars accommodating thirty passengers. The buses will leave 628 Pennsylvania Avenue, S. E., Washington, D. C., weekdays at 7.45 a. m. and 5 p. m. On Sunday they will leave 8.45 a. m. and 5 p. m. All buses will make connections with southern Maryland and Popes Creek trains for Hughesville, Charlotte Hall, Mechanicsville, Waldorf, White Plains and La Plata. The route to Brandywine will be via Silver Hill, Bedds Corner, Surrattsville and T. B.

The Post Office Department of the Indian Government, having found the employment of motor traction for mail a great success in Rangoon, Burma, is considering the introduction of motor trucks in Calcutta, Bombay and Madras, to replace the large number of horse-drawn vehicles now in use in those towns.

Cleveland Railways Company, Cleveland, Ohio, plans to establish motor bus lines in several outlying districts of the city. It is the intention of the company to operate two buses as an experiment, and if successful, to establish additional service.

Lima Motor Transit Company, Lima, Ohio, has received the first of a fleet of four motor buses for the purpose of carrying passengers in Lima and vicinity. The car is of the pay-as-you-enter type, and carries twenty-two passengers.

The Bear Valley Transportation Company, of San Bernardino, Cal., operates a fleet of three trucks between San Bernardino, Redlands and Pine Knot Lodge, the round trip being 70 miles. The trucks climb from an elevation of from 1200 ft. at Redlands to 8500 ft. at Pine Knot Lodge, some of the grades along this distance reach 20 per cent.



Fully Equipped Garage

Ample-sized doorways in garage allow the trucks plenty of room for leaving and entering



Motor Truck Design and Construction Made Plain Advantages and Disadvantages of Different Types Discussed

By C. T. SCHAEFER, Member Society Automobile Engineers

This is the ninth installment of a series of articles by this well-known writer, covering in a non-technical way the various constructions now current practice in commercial car design. These articles will take up, in order, the general types of chassis, the advantages and disadvantages of each, illustrated by simple diagrams, and in logical order, motor construction, ignition, carburetion, cooling, lubrication, etc., until each part of the truck has been dealt with.

IGNITION — LOW-TENSION MAGNETO AND BATTERY SYSTEMS

A preceding article took up and explained the high-tension type of magneto. A following article will take up the inductor type of high and low-tension magnetos. The three articles will completely explain ignition on commercial cars.—Ed.

PART IX

AS mentioned in the previous article, all systems using a spark plug are termed high-tension systems; however, a low tension magneto may be used with a transformer coil. Reference was made to the instrument having a single winding on its armature and employing a step-up coil with a primary and secondary winding. This type of magneto combined with the coil is termed a high-tension system, although a low-tension current is obtained from the instrument itself. However, this low-tension current is transformed into a high-tension by the coil.

These coils are similar to those used in connection with battery systems, and as but few more wires are necessary to use a battery current, the system is generally of the dual type, making use of the magneto interrupter and distributor for both magneto and battery current. The low-tension magneto is sometimes defined as the primary armature type, as it incorporates but a single or primary winding in the magnetic field.

The construction of a low-tension magneto is similar to that of the high-tension type. It consists of permanent magnets of inverted U shape, and pole pieces bored out cylindrically, mounted upon a non-metallic base. The armature is also of H section, carries a primary winding and serves to form a bridge for the magnetic flux between the pole pieces. The armature core is wrapped with primary wire until the slot is almost filled. The insulating cloth is then put in place and the armature banded.

A low voltage current is furnished by the magneto armature to the primary winding of the coil, while a secondary winding in the coil transforms this to a high voltage.

The interrupter and distributor are similar to the high-tension type and perform the same functions in the system.

The main constructive difference between the low and high-tension types is that the former has but one winding on the armature, using a transformer coil to raise current pressure value, whereas the high-tension type has a secondary winding incorporated in the armature.

The principle of a rotating armature and the method of generating current in the magnetic field was explained in the previous article. We may now discuss the method of transforming the low-tension current to a high tension.

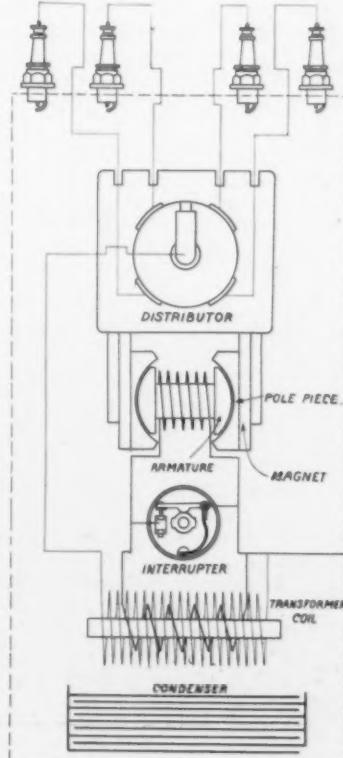


Fig. 1. Wiring Diagram of a Low-Tension Magneto With External Transformer Coil

The broken lines indicate "ground" or engine frame

Figure 1 is a wiring diagram of this type, with external transformer coil. It will be noted that the primary winding of the transformer is so connected with the magneto armature winding that it completes the metallic circuit through the latter. That is, the transformer primary is in series with the armature winding. The breaker points are separated at definite intervals, and are so connected into the armature and transformer primary circuit that a direct short circuit through the armature winding is caused when they are in contact. The breaker points are here said to be connected in parallel with the transformer primary.

As the induced electric pressure within the armature winding rises in value, due to the motion of the armature in the magnetic field, it flows through the circuit formed by the armature winding and the circuit breaker points until the instant at which it has attained its maximum value, when the contact points are separated and the direct short circuit broken. When this separation of the points occurs, the induced electric pressure is caused to enter the transformer primary with great suddenness and create lines of force through the transformer windings with extreme rapidity. This entry by the current and consequent creation of lines of force causes the lines to cut the secondary winding during the formation of the magnetic field about the transformer, and this cutting induces an electrical pressure within the secondary.

Of course with this system the armature of the magneto is positively driven from the engine by gears, so that the points of maximum pressure induction in the armature winding may coincide with the instants at which ignition sparks are desired within the engine cylinders. Such a single transformer with a single breaker is employed and all the current for ignition is generated therein; it is necessary that some means be fitted for the distribution and consecutive connections of the transformer secondary with the proper spark plugs in the cylinders. This distribution is accomplished by a distributor, also made an integral part of the magneto, and driven positively and in a definite relation-

ship with the circuit breaker as in the high-tension type.

Again referring to Fig. 1, it is seen that the ends of the transformer secondary winding are connected, for the completion of its circuit through the spark plugs, one to engine frame, or in other words, one end is grounded and the other the central carbon brush holder of the distributor.

This distributor is of the same construction as in the high-tension system, so that the high-tension current induced in the secondary winding will be forced to follow the path selected for it, depending upon the position of the carbon brush of the distributor. In this illustration the heavy lines illustrate the primary circuit and the light lines the secondary circuit.

Most coils in use at the present writing are of the non-vibrating type, the trembler type of box coil having been discarded long ago, and the interrupter is now operated mechanically instead of electrically.

These non-vibrating or transformer coils, as they are termed, are made in various styles, and sometimes incorporate the switch and a push button for starting on the spark.

The most popular type is the tube coil with switch, which can be mounted on the dash under the hood with switch on the outside, within reach of the operator. In some cases the coil is made separately and mounted under the hood, while the switch has the usual position on the dash.

Figure 2 illustrates the wound core of a transformer coil, complete with condenser and condenser casing. These coils are mounted in a tubular case provided with front and rear end plates. The front plate carries the switch handle and push button, while the rear end carries the terminal and is enclosed by a cover, so that the coil and connections are thoroughly protected.

The push button is used for producing a spark in the cylinder by interrupting the primary circuit leading from the battery, taking the place momentarily of the breaker on the magneto. Some coils are fitted with a ratchet mechanism giving a series of sparks in the cylinder. Some are

also provided with a lock and key, so that the switch may be locked in the "off" position, preventing the unauthorized use of the truck.

The action of the switch was explained in the previous article, in connection with the dual system, and requires no further discussion.

The battery system, providing a jump spark, was extensively used before the magneto became so popular. This system requires a series of dry cells or a storage battery, affording a low-tension current and a timer, the current being stepped-up to a high tension by induction. The principle of self-induction is as follows:

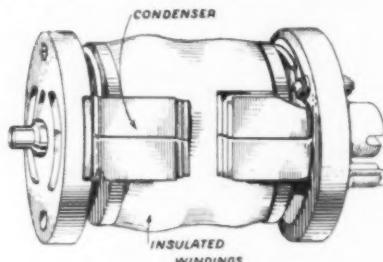


Fig. 2. Transformer Coil With Condenser

A current flowing through a coil of wire will set up a magnetic field in the surrounding space, but when the current is stopped the magnetic field will stop. The effect of the stoppage of the flow of current in this coil is the same as that due to the change of position of the wire coil in a magnetic field, so that when the current is stopped there will be a current induced in the coil. The result is that when the circuit is broken to stop the current, the decrease in the current adds momentarily to the electromotive action in the circuit and a visible spark, or even an arc, is formed at the break.

Figure 3 makes clear the principles of an induction coil, showing the primary and secondary windings, the primary and secondary circuits and the other components of the system.

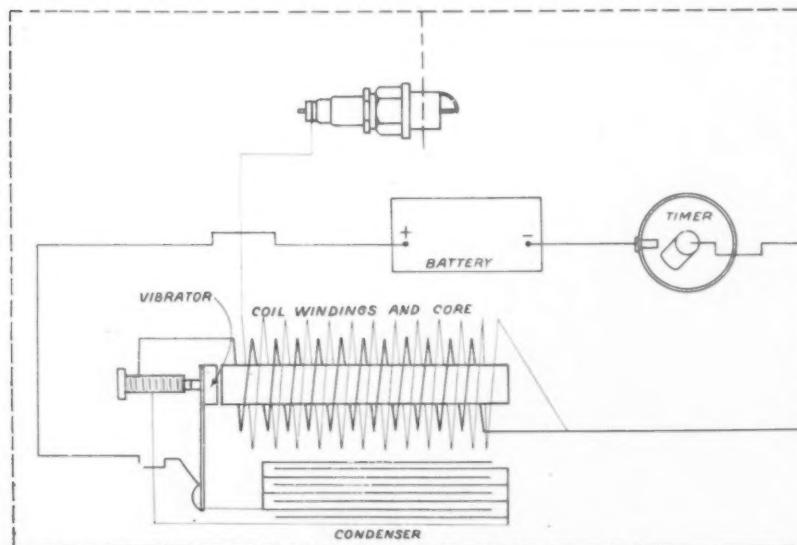


Fig. 3. Diagram of Induction Coil and the Other Components of a Battery System

The primary and secondary windings are identical with those of the compound armature, or high-tension magneto, the former consisting of a small number of turns of coarse insulated wire, while the latter is a very fine silk insulated wire, and the number of turns greatly exceeds those of the primary winding. In this system no mechanically operated interrupter is used for breaking the primary circuit, this being accomplished by a device for automatically and rapidly making and breaking the circuit.

This device is known as a vibrator or trembler, as it is sometimes termed, and consists of an iron disc of approximately the same diameter as the core of the coil, attached to flat spring and a platinum point located above the disc. An adjusting screw mounted above the disc carries another platinum point. These points are so situated on the coil that they make contact with each other. When these two points are in contact, the primary circuit is closed.

The automatic action of this vibrator is as follows: The current flowing through the primary circuit of the coil makes an electro magnet of the core, which attracts the iron disc attached to the vibrator spring, causing the points to separate. As the current is interrupted by the separation of these points, the core ceases to be an electro magnet, since no current is flowing through it and the disc is no longer attracted, permitting the points to make contact and again complete the primary circuit. This action continues as long as the current flows and is interrupted in the primary circuit. By varying the adjustment of the adjusting screws the number of sparks in a given time are varied, as is also the strength of the individual sparks.

To prevent prolonging the magnetization of the core beyond the desired limit, a condenser is connected with the contact points to absorb the surplus current induced in the primary circuit, due to the breaking of the circuit. In other words, when the points are in contact, the condenser is short circuited, but when the circuit is broken the induced current, instead of jumping across the gap, passes into the condenser, and as the circuit is again completed it passes out again and into the circuit. A commutator, or timer, is used to determine the exact time in the cycle of the engine at which ignition occurs.

The diagram shown herewith represents a single-cylinder system, while multi-cylinder engines require a coil for each cylinder, but the battery current passing into the primary winding of the coils is controlled by a single switch. The coil units are incorporated in a box or housing which is mounted on the dash board, with a removable cover, so that any coil may be adjusted. As each coil is a separate unit, they may be so constructed that they may easily be replaced should they become defective, without disturbing any connections.

In every high-tension battery system a device is required for opening and closing the primary circuit at the proper instant, with respect to the cycle of the engine, and the position of the piston in the cylinder. This device is known as the timer, because it determines the exact time in

the cycle of the engine at which ignition occurs and permits of varying this point at will while the engine is in operation. It is positively driven by gears from the motor either direct or through an auxiliary shaft from the cam shaft. This timer, Fig. 4, consists of a housing containing a roller and arm members so mounted upon the driving shaft that the roller and arm members may rotate, while the housing is held stationary by means of a rod or lever, which may be moved in either direction to advance or retard the spark. Within the housing is a fibre ring in which are mounted metal contact segments, the surfaces of which are flush with the fibre.

These segments are held in position by screw bolts which pass through the fibre ring and housing, but are insulated from the latter. These screw bolts are provided with thumb nuts and terminals to which is secured a primary wire, which in turn is connected to the primary terminal of the induction coil.

The operation of the timer is as follows: The shaft actuating the roller is metal, and one lead from the battery is connected to the frame, or other metal part, and the current is conducted from its source to the metal segment. As the roller makes contact with the segment in the fibre ring, the circuit is closed and the current flows through the roller frame and primary wire back to its original source. As the roller contact with the segment is broken, the primary current in the coil is established and broken as previously described, being built up in the secondary winding, and a spark produced at the gap of the spark plug electrodes.

The vibrator coil system has its disadvantages, having several primary contacts, sliding or rolling contacts in the timer, and a delicate, magnetic interrupter. To overcome these faults, igniters were introduced which combine a mechanical interrupter with a high-tension distributor. The induction coil is replaced by a transformer coil, as used with the primary armature type of magneto. With the igniter system but one primary contact is necessary and the circuit is made and broken positively by mechanical means.

The contact maker is of the single spark type and similar in construction to the one used on the high and low tension magnetos. It is driven from the cam shaft by gears and runs at half the speed of the engine and replaces the timer in the vibrator system.

The contact points are generally so constructed that they may be adjusted from the outside without dismantling the unit.

Directly above the contact maker is located the high tension distributor. Its construction is similar to the high tension magneto distributor, using a central contact brush and segments located radially which are connected with the spark plugs of the motor.

The advantages of this system over the vibrator coil system are twofold. As there is only one set of wearing parts, whatever wear occurs will affect the timing of all cylinders equally and subsequently a per-

fect relationship is maintained at all times. Again the character of the spark in all cylinders must be identical.

Fig. 5 indicates the path of the current in the igniter system, passing from the battery to the switch on the coil, thence to the interrupter, from where it is led to the coil and stepped-up to a high pressure. From the coil it passes through a conductor to the central contact of the distributor and is distributed to the cylinders in proper sequence.

Either the vibrator and timer system, or the igniter system, may be used in connection with either the primary or compound armature magneto, thus forming two separate systems of ignition, with either

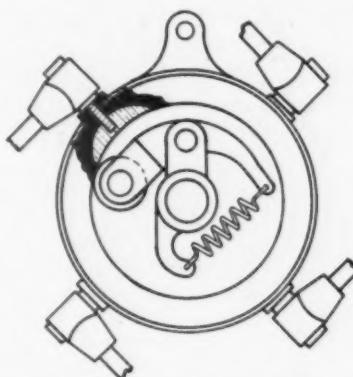


Fig. 4. Timer for Battery System

one or two sets of spark plugs. With the former type the magneto distributor is used for both systems, while a vibrator and a transformer coil are mounted together and controlled by a single switch. When the compound armature magneto is used but one coil is necessary for the battery system. The above is also true of the igniter and transformer coil, excepting, of course, that but one coil is necessary for either type of magneto.

YOSEMITE HAS MOTOR OMNIBUS SERVICE

Yosemite Transportation Company has recently ordered five White motor trucks, which have been fitted with omnibus bodies to carry tourists from El Portal, Cal., to the heart of the Yosemite, this most wonderful of all parks. Motors have replaced the horse-drawn stages and buses in carrying passenger and freight in and out of this vast national reserve. A similar service is rendered to tourists at Mount Rainier National Park by a fleet of Whites.

TRUCKS OPERATE BETWEEN MINING CAMPS

Two mining camps, Schurz and Rawhide, Nev., have been connected by a fleet of three Packard trucks, operated by Lou Little. Throughout the entire winter he has been hauling mail and passengers, as well as freight, over a sixty-mile round-trip run with the fleet consisting of two three-ton and one five-ton trucks. The three-ton trucks have made an average of 9000 miles per month, and the five-ton truck has covered 6000 miles per month.

The Youghiogheny Coal Company, of Pittsburgh, Pa., shows according to its record sheets that its five-ton Peerless truck delivered from 250 to 400 tons of coal in a single night. This coal company has a contract for coaling a number of large buildings in the downtown section of Pittsburgh. It operates a dock at the foot of 8th Street where coal is unloaded from barges and put into overhead bins. From here an average haulage of 4-5 of a mile has to be made to the buildings to be supplied with coal. On a particular night this truck hauled a total of 60 loads amounting to 370 tons, in 11½ hours. On another night another truck of the same fleet, a six-ton truck, covered 32 miles and delivered 248 tons or 41 loads in 10 hours.

General Automobile Company, 55 Stanhope Street, Boston, Mass., is making a specialty of New England-built commercial bodies for Ford cars.

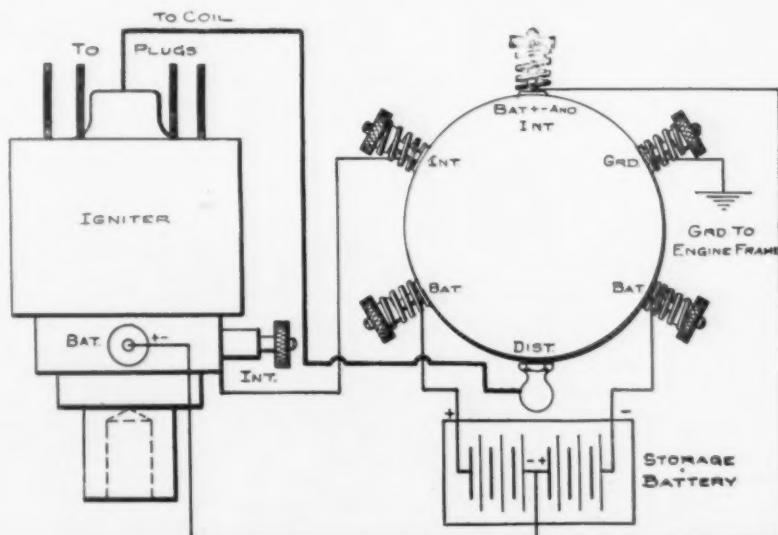


Fig. 5. Indicating the Path of Current in an Igniter System



Official Results of the French Four-Wheel Drive Trials

Latil and Renault Successful in Light and Heavy Class Respectively

By JONES

THE official results of the Four-wheel Drive Tractor Trials recently held in France have just been announced.

Main Conditions of the Trial
There is no need to enter into the detail regulations of these trials; it is sufficient to generalize. The event included heavy and light tractors driving on all four wheels which had to be rubber-tired. The first of these classes had to be capable of hauling 15 tons, and the second 8 tons, without themselves weighing more than $7\frac{1}{2}$ and $5\frac{1}{2}$ tons respectively, inclusive of a useful load of 2 tons; in other words, the tractors were limited to $5\frac{1}{2}$ and $3\frac{1}{2}$ tons empty. Axle weights were limited to $4\frac{1}{2}$ tons. Each tractor by itself had to be capable of ascending 18 per cent grades (about 1 in $5\frac{1}{2}$) and of making a mean speed of 9.1-3 m.p.h., without exceeding about $15\frac{1}{2}$ m.p.h. With trailer attached, each machine had to be capable of ascending 12 per cent (1 in 8 1-3) grades, and averaging just short of 5 m.p.h., without exceeding 9.1-3 m.p.h.; while it had to ascend a 6 per cent grade at a speed not exceeding 3.1 m.p.h. Finally, the tractor had to be capable of hauling its trailers with its winding gear up grades of 15 per cent, and across any country that military wagons might be expected to traverse. These trailers were fitted with iron tires, the heavier ones each weighed $7\frac{1}{2}$ tons loaded, the light ones 5 tons, 50 to 60 per cent of which as a rule represented useful load.

Details of Tractors and Trailers

The accompanying tables will, however, best give the details of both tractors and trailers.

Official Results

Here are the official results:

Light type tractors:

First: No. 9 Latil.

Second: No. 2 Châtillon-Panhard.

Third: No. 1 Châtillon-Panhard.

Heavy type tractors:

First: Nos. 11 and 12 Renault.

Second: Nos. 8 and 7 Latil.

Third: Nos. 3 and 4 Châtillon-Panhard.

Fourth: Nos. 13 and 14 Schneider.

In Fine Weather

In fine weather on the whole the tractors have fulfilled hopes: a mean speed of

nearly 11.2 m.p.h. was easily maintained by the tractors alone, and over $6\frac{1}{2}$ m.p.h. when hauling their trains. By themselves, too, the tractors mounted practically every hill they came to, and when hauling in general they satisfied requirements, except that a speed of 3.1 m.p.h. up a 6 per cent grade was scarcely attained by a single make. Hauling the trains by capstan, however, up a 15 per cent grade seemed in general a job above the weight of the machines, most of which could only manage 12 or 13 per cent. grades in this matter. Indeed the winding gear results were only very middling; but the trouble appears to lie only in matters of detail, and it seems as if there should be no difficulty in removing defects in this direction.

In Wet Weather—Abnormal March

So much for fine weather performance; but March, the month of the trial, was exceptionally wet, and afforded unusually and valuably severe conditions for testing. Yet although there has been a tendency to exaggerate the severity of these conditions, still frequently the conditions became alto-

gether excessive, and the difficulties quite abnormal in their severity. But if these happenings prevented the tractors showing up as well as had been hoped, the performance of the machines left no room for doubt as to the possibility of a tractor hauling double its own weight so long as the adhesion was reasonable. This adhesion with rubber tires does not ordinarily appear to exceed .5 on perfectly dry and good macadam, and even with anti-skid chains it seemed impossible to get above this value. As soon as the macadam became the least bit heavy, the adhesion of the wheels rapidly fell. Indeed, on a hill at Nogent-sur-Marne the wheel adhesion of the first tractors, though furnished with anti-skid chains, could not exceed .39 to .40, although an hour afterwards, when the slight coat of mud had hardened, the adhesion went up to .50, and the train which had had difficulties even when fitted with anti-skid chains easily ascended without chains. On chalky clay the adhesion in wet weather fell as low as .25 to .30, a point at which a tractor certainly could not haul double its weight up a grade of 7 per cent.

DETAILS OF TRACTORS AND TRAILERS

Name	No. Vehicle	WEIGHT EMPTY			WEIGHT LOADED			Useful Load Carried—Ibs.	Weight Hauled—Ibs.	Total Weight Hauled—Ibs.
		Total Ibs.	Front Ibs.	Back Ibs.	Total Ibs.	Front Ibs.	Back Ibs.			
Panhard (light)	1 Tractor	10516	5280	5236	12100	5588	6512	1694	.151	18920
Panhard (light)	Trailer (A)	5150	—	—	7920	—	—	2255	.438	31020
Panhard (light)	Trailer (B)	6237	—	—	11000	—	—	4763	.703	
Panhard (light)	2 Tractor	10560	5522	5038	12100	5709	6391	1694	.145	22000
Panhard (light)	Trailer (A)	6171	—	—	11000	—	—	4820	.783	
Panhard (light)	Trailer (B)	6215	—	—	11000	—	—	4785	.760	
Panhard (heavy)	3 Tractor	12067	6347	5720	15017	6677	9240	3850	.319	33000
Panhard (heavy)	Trailer (A)	7480	—	—	16500	—	—	9020	1.205	
Panhard (heavy)	Trailer (B)	7502	—	—	16500	—	—	8998	1.199	
Panhard (heavy)	4 Tractor	12221	6557	5764	15994	6798	9196	3773	.302	33000
Panhard (heavy)	Trailer (A)	8195	—	—	16500	—	—	8305	1.013	
Panhard (heavy)	Trailer (B)	8173	—	—	16500	—	—	8327	1.018	
Latil (light)	9 Tractor	9460	5269	4191	12100	6028	6072	2640	.279	18337
Latil (light)	Trailer (A)	5038	—	—	11000	—	—	5964	1.183	30437
Latil (heavy)	7 Tractor	11550	6468	5082	15752	7832	7920	4202	.363	34100
Latil (heavy)	Trailer (A)	6512	—	—	16500	—	—	9988	1.533	
Latil (heavy)	Trailer (B)	6688	—	—	16500	—	—	9812	1.467	
Latil (heavy)	8 Tractor	11319	6413	4906	15572	7749	7833	4433	.391	33000
Latil (heavy)	Trailer (A)	—	—	—	16214	—	—	—	—	
Latil (heavy)	Trailer (B)	—	—	—	16214	—	—	—	—	
Renault (heavy)	11 Tractor	12419	6479	5940	16500	6930	9570	4081	.328	34760
Renault (heavy)	Trailer (A)	—	—	—	17435	—	—	—	—	
Renault (heavy)	Trailer (B)	—	—	—	17325	—	—	—	—	
Renault (heavy)	12 Tractor	12430	6204	6226	16500	6820	9680	4070	.327	34320
Renault (heavy)	Trailer (A)	—	—	—	17204	—	—	—	—	
Renault (heavy)	Trailer (B)	—	—	—	16116	—	—	—	—	
Schneider (heavy)	13 Tractor	12991	6600	6391	16500	8250	8250	3509	.270	33000
Schneider (heavy)	Trailer (A)	—	—	—	16500	—	—	—	—	
Schneider (heavy)	Trailer (B)	—	—	—	16500	—	—	—	—	
Schneider (heavy)	14 Tractor	12958	6622	6336	16500	8338	8162	3542	.273	3300
Schneider (heavy)	Trailer (A)	—	—	—	16566	—	—	—	—	
Schneider (heavy)	Trailer (B)	—	—	—	16434	—	—	—	—	

The same results were found across country over soft or slippery soil, which, in some cases, showed that the wheels of the trailers were too narrow, for they sunk up to the axle caps, and opposed resistance out of all reason. Over heavy and soft ground, too, the driving wheels of the tractors slipped or were unable to advance, though the tractors by themselves with the special devices with which they were fitted managed to traverse everything, though they often could not haul their train without having recourse to the winding gear. Yet, wherever they went, each tractor somehow or another, by the help of its ramps and winding gear managed to win through with itself and trailer, though sometimes the vehicles were sunk into the ground so that their frames were touching earth.

While in dry weather the adhesion of the four-wheel drive machines was quite remarkable and immeasurably beyond that of ordinary cars, in wet weather on heavy or soft ground the adhesion was certainly not sufficient; anti-skid chains gave good results in a good many cases, but further experiment and experience is needed in the use of these, and other methods of working on soft ground. Of the other systems, the method of putting bracelets round the wheels seemed to give very good results on soft ground.

Winding Gears

Generally speaking, the winding gears resolve themselves into vertical capstans or horizontal drums, usually worm-driven, their transmission generally being arranged so that all four speeds of the gear box are available. But these drums were invariably arranged so that the pull of the winding rope was in the direction of the travel of the road wheels, not at right angles to the track as is often the case. Accordingly, special steps had to be taken to hold the machine stationary, and these usually took the form of spraggs with flat shields or guards to prevent them sinking too deeply into the ground. In some cases it was found that the action of these winding gears tended to tip up the opposite end of the chassis, and this is a point to which in future we shall see more attention given.

Some of these winding gears are far from perfect, though some of their apparent defectiveness was due to lack of experience in their use. The drums, however, were sometimes too small in diameter, and ran at too high speeds. The question of their gearing requires further study. The

hills, and only one of the tractors, to wit, the Schneider, could be held on the worst inclines by only a single brake; though, with both brakes at work, all the tractors could be held up on the steepest hills. If, however, they were allowed to gather any way there was some difficulty in pulling them up. In general, the result of the trial points to the future employment of a simple brake that will be continuous along the whole train; probably something like that employed on certain trailer-hauling vehicles in Great Britain, or like the Lemoine system in France.

The Four-Wheel Tractor of the Future

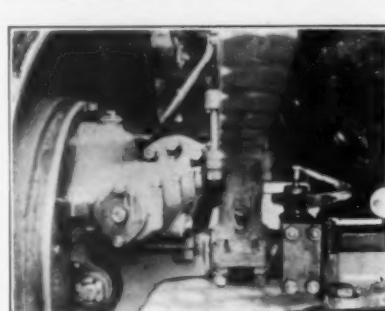
In addition to this, the general opinion of the officers conducting these trials seems to point towards the use of an engine of about 60 h.p. in future geared on the low ratio, so as to give a road speed of about 1.55 to 1.69 m.p.m. The five speeds in the Latil and the use of a multiplying gear on the Châtillon-Panhard, which enabled the four-speed gear box of that machine to afford eight different ratios, did very well, and these are features that are likely to become more frequent in either designs, provided they do not involve undue complications, and there is no reason why they should.

For Working Over Bad Patches

There were some interesting devices for working over soft country. On the Schneider, the running board was formed in the shape of a girder trough which could be detached so as to afford a ramp over soft ground; but perhaps the most interesting were some devices which were merely strips of stout wicker work about 4 ft. long and 18 in. to 2 ft. wide, bound at each end with iron. Working over a strip of soft ground sixty or more of these might be in use on each side, placed under the wheels to afford a track in passing over them, of course, the tractor wheels doubled them up U shape, and as fast as the wheels passed over them, soldiers picked them up and placed them in front of the wheels with the curve of the bend convexly upwards, so that the previous deformation was more than neutralized when the wheel passed over it again. These devices are, of course, very light, and are so successful that other European governments have already begun to experiment with them. We shall hear more of them before long.



Renault With Trailers, on a Winding Grade

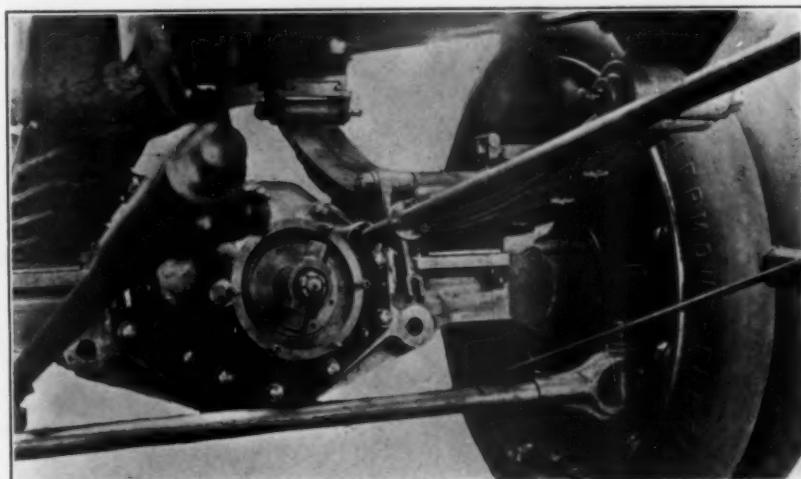


Drive of Panhard Châtillon

anchorage of the tractors during winding operations often showed much to be desired, and wedges were often badly placed; spraggs were wanted, while the spuds were generally too weak or badly placed.

Brakes

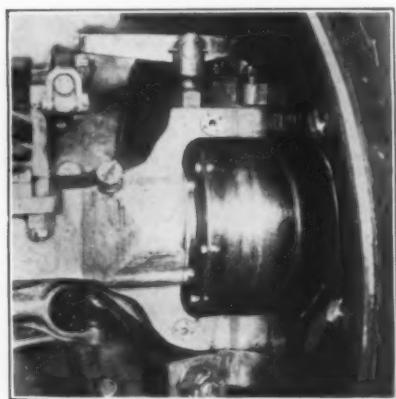
In general, the brakes on the trailers were insufficient to hold them on the worst



Renault Rear Axle as Seen From Front
Propeller shaft has been dismounted

The Early Development of the Four-Wheel Drive in Europe

The origin of these trials is not without interest. The first experiences that we had in Europe with a four-wheel drive tractor were some six or seven years ago, when a French commission on military transport experimented with an Austrian Daimler automobile-mitrailleuse, first on the slopes of Mont-Valérien, and afterwards in the polygone des Matelots at Versailles. The results then obtained over ground cut up with deep wheel ruts and strewn with stones and obstacles, including 30 per cent grades, were instructive in proving the possibilities of the four-wheel drive. But the automobile manufacturing industry was not then ripe for the production of such a special type of machine involving so much experimental work, and for a time the matter dropped. The trials bore fruit,



Renault Axle

however, for Colonel Depot, the organizer of the French artillery had for a long time been on the lookout for a suitable method of transporting artillery across country, and having become consulting engineer to the Compagnie des Forges de Châtillon-Commentry, towards 1910 he persuaded Panhard et Levassor to study the question. Thus, at the beginning of 1911 was the Châtillon-Panhard tractor built. During the Army Reliability Trials of 1911 the

new machine underwent various official tests at Satory, climbing grades of 11 per cent with a total load of 18 tons, and on the manoeuvre ground crossing such obstacles as hedges and banks, and, incidentally, a tree trunk 13 1/4 in. diameter. These tests



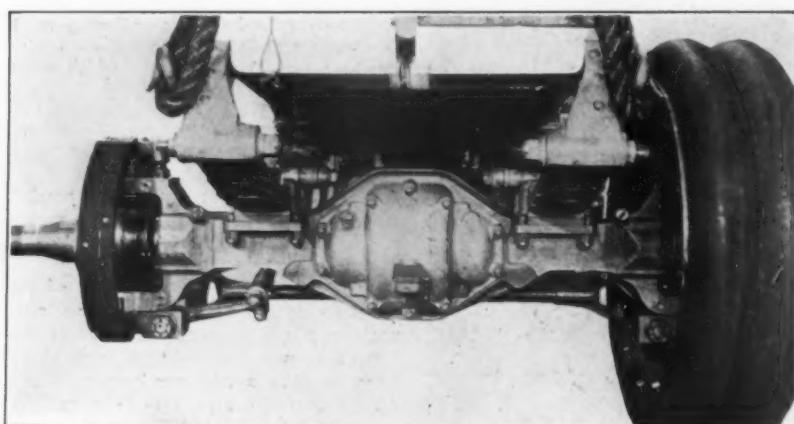
Schneider Tractor

Showing how the ramp is utilized as a runningboard

attracted the attention of the French War Office, and in July, 1912, the Minister of War was officially represented at some trials which gave such remarkable results as to decide the artillery authorities to go further in the matter. In fact, it was these results that led the War Office to organize the trials of March last, and at the same time to buy a certain number of Châtillon-Panhard tractors, which proved very successful in the 1913 manoeuvres.

A Few Details of the Renault—A Successful Entrant

The Renault engine has four cylinders cast in pairs, having a bore of 5 1/2 in. full, and a stroke of 6 5/16 in. At 1000 r.p.m. it develops 35 h.p., and 1400 45 h.p. The carburetor, ignition and forced oil circulation call for no particular remark, beyond saying that they are all up to date, but it is worth mentioning that the circulation system, which has to keep the engine going for at least 30 minutes with the tractor stationary, depends on the thermosyphon principle. With its three sliding gears, the gear box affords four forward ratios, giving speeds of 2.17, 3.73, 5.59 and 9.32 m.p.h. From the gear box universal shafts are carried both backwards and forwards to drive both axles through bevel transmission. Each axle, too, is furnished with bevel differentials, which can be locked together for traversing loose or slippery ground. Both pairs of wheels are



Renault Front Axle
One wheel has been removed

capable of steering, each controlled by a separate worm and sector box worked from the steering wheel, and each wheel is driven by a shaft, the centers of whose universal joints are in vertical alignment with those of the pivot round which the wheel steers. All the wheels, which are of steel, are of equal diameter, and furnished with twin tires of 1000x140 mm. The chassis also carries a powerful capstan placed at the back and driven by worm gear in such a manner that it can take advantage of all four changes of speed. Finally, the weight of the tractor when empty is just over 12,400 lbs., and the useful load it carries amounts to 4400 lbs.

RESULTS OF THE GERMAN ARMY SUBVENTION SCHEME

Just Five Years' Working

When the scheme of subsidizing commercial cars for military requirements in Germany was first instituted, the period of subsidy was placed at 5 years. On the 31st March last year the first 5 years of the subsidy scheme expired, and particulars of its working during this period are now available. Hitherto only complete equipments composed of four-ton trucks and trailer have been subsidized, and during the 5 years 825 of these have come under the subvention scheme, 82 of them hailing from Bavaria. If one adds to this number the 400 vehicles not subsidized, but delivered by the German industry during the same period, we get 1200 vehicles in round figures at the disposition of the German Army in the case of need.

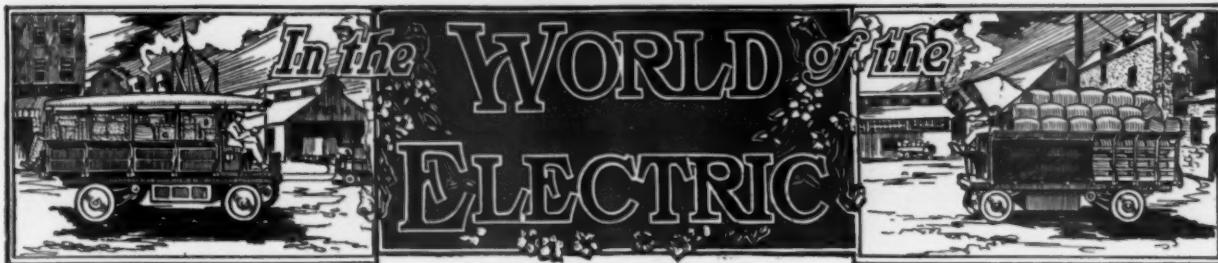
Though the scheme at its inception was, in the words of its author, "a jump in the dark," and denounced by a good many as insanity, it has given good results on the whole.

At the end of the first 5 years 40 per cent. of the subsidized vehicles have been recorded as still fit for every requirement, 30 per cent. as having possibilities within limits, while 30 per cent. have to be replaced.

The trades as represented by the users of these subvention wagons work out to the following proportions: Brewers, 340; foodstuffs, 172; brickmakers, 66; millers, 53; agriculture, 34; builders' materials, 43; metallurgical industries, 29; quarrying and stone industry, 29; carriers, 25; coal industry, 17; paper making, 9; publishing and printing, 8; total, 825.

Since the 1st of April last year not only complete equipments of trucks with trailers, but trucks by themselves have been eligible for the subsidy, the rate having been modified accordingly, so that the single motor truck is granted about two-thirds of the subsidy allowed to the complete "train," as it is called, of truck and trailer.

Austria is following the lead of America, for the Austrian War Office is now experimenting with a gasoline-electric train somewhat on the lines of the Alden Samson. That is to say, each of the trailers are self-moving by means of an electric motor driving the road wheel through gearing, while the current is supplied from a dynamo driven by a 150-h.p. engine on the leading vehicle, which is also, of course, equipped with the electrical transmission.



DIFFERENT TYPES OF ELECTRICS USED BY BREWERS

The pronounced success of the electric truck in brewery transportation has been due primarily to the natural fitness of the electric to handle quickly and economically heavy loads with many stops, even when manned by inexperienced truck drivers. In addition to the natural advantage of the electric itself, much has been accomplished in special body design which further facilitates the rapid handling of many kegs and cases.

The accompanying illustrations show different types of electric trucks which have been designed and built by The Baker Motor Vehicle Company, of Cleveland, for brewery use. All of these trucks have proven themselves peculiarly fitted by their special design in actual brewery service.

The Keg-Roll Truck is equipped with a specially designed steel body, the bed of which is made of steel "I"-beams. The "I"-beams are padded with oval iron which does away with the constant wear on the wooden kegs familiar to every brewer. The back is equipped with sign panel of German type. This truck is of four-ton capacity and has a loading space 15 ft. 6 in. long and 62 in. wide. Its capacity for both weight and bulk enable it to carry forty full half-kegs and fifty-nine empty half-kegs. The body is so constructed that it will carry eighth, fourth, half and full size barrels. One of the practical advantages of the body construction is that it is lower than the average horse-drawn roll wagon. The driver's seat is equipped with storm front and side curtains which, when lowered, form a complete enclosure.

Another illustration shows a splendidly designed shipping truck of four-ton capacity which carries 100 36-bottle cases with the bottles filled; it carries 150 24-bottle cases with the bottles filled. The length of the loading space is 180 in., the width 63 in.; height of stake sides, 52 in. The driving compartment is equipped with storm curtains. Any portion of the stake sides or end can be readily removed to allow access to any part of the load. For general hauling of cases and barrels this truck is of excellent design.

A third illustration shows a shipping truck of the same capacity, but with an over-all roof and folding step construction for entrance at the end or either side. In this truck the side door stakes and end stakes are removable. A driver leaving the brewery with a complete load of full cases starts unloading from either side; as he picks up empty cases he loads them into the truck from the front toward the rear, working continually farther back in the truck; toward the end of the trip he is

working from the rear door instead of the side doors and has completely unloaded and reloaded the truck without shifting cases.

The bottle truck is a 3000-lb. truck with loading space 112 in. long, 46 in. wide and 60 in. high. It carries fifty-four cases of twenty-four bottles each. The cases are arranged in two rows, nine cases long by three tiers high. Each side panel of the body is made of two sliding doors, each door one-half the length of the body. There is no opening in the rear. Each door slides on roller bearings on an overhead truck which is always free from dirt. The doors are equipped with spring locks which cannot be opened without the key. By using this system of doors the driver can take out any case of bottles without disturbing any part of the load. As the truck is unloaded and filled with empty cases there is no handling of empties to get at the full cases as is the case when access is made through the rear. The floor of the body slants toward the center on each side and keeps the cases from sliding against the doors and making them hard to open.

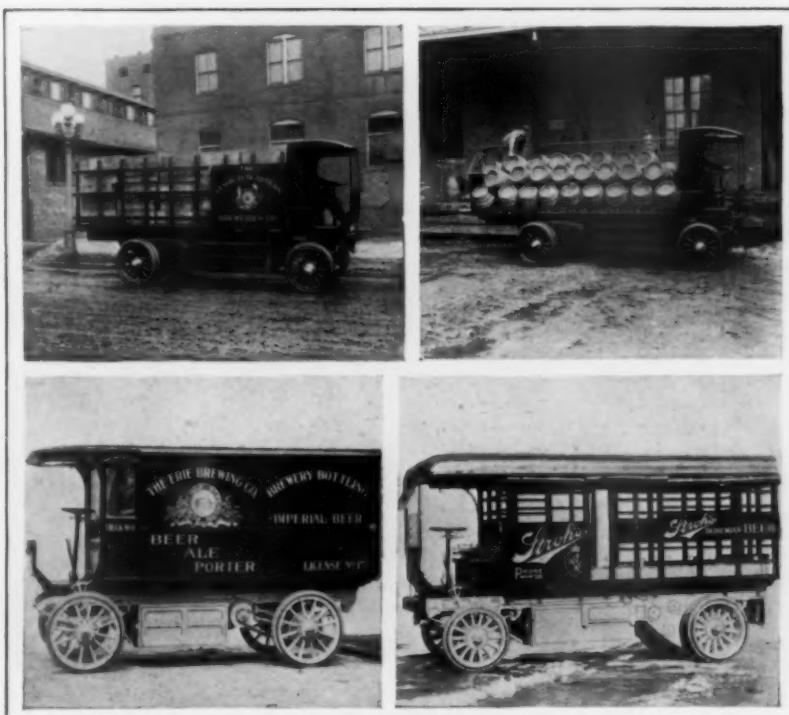
Similar bottle trucks have been constructed by The Baker Company with shelv-

ing arranged for different sized cases so that a mixed load can be carried and handled without shifting cases. Still another variation is the elimination of the shelving in the rear of the truck and the building in of a double deck rack for carrying half barrels and kegs. This converts the bottle wagon into a combination bottle and case truck that is exceedingly handy in the brewery delivery system.

Baker Trucks similar to this one, built for use in climates of extreme heat, have been equipped with double panel bodies packed between the panels with powdered cork. This special construction has proved of remarkable value in keeping out the torrid heat.

A NOVEL THREE-WHEELED ELECTRIC

On the streets of New York City may daily be seen a very novel little vehicle of the three-wheeled type in the service of Stern Brothers, a drygoods house, at West 42nd Street and 6th Avenue. This little vehicle is called the B. E. F., and was imported from Germany, being the product of the Berliner Electrik Fabrik of Berlin.



Four Baker Trucks, Each Fitted With a Special Body to Take Care of a Particular Service

The front wheel is driven by a $1\frac{1}{2}$ h. p. motor, mounted directly over it on the steering head taking current from a 20 cell 9 plate battery under the driver's seat. At the rear of the driver is a good-sized van, having a capacity of about 500 lbs. The front wheel not only drives but steers the vehicle. All three wheels are of wire construction, fitted with pneumatic tires. It has a speed of 12 m.p.h. and a range of 25 miles on a single charge.

Since the introduction of this vehicle, Stern Brothers have placed two more of these machines in service, handling special delivery to a series of hotels within a radius of a few miles of the store. Their work is entirely special delivery of goods purchased by patrons of the various hotels. All such purchases are as a rule required within a few hours owing to the transient nature of the trade. The vehicles have been found very satisfactory for this work, although limited to 25 miles on a charge.

The cost in this country taking everything into consideration brings the price almost to the prohibitive figure of \$1550 each. Nevertheless, the fact that merchants are willing to import such vehicles and pay these prices shows the growing demand for vehicles in this class of service.

CONVENTION OF NEW ENGLAND ELECTRIC VEHICLE INTERESTS

By far the most successful convention of the New England Electric Vehicle interests, conducted jointly by the Electric Motor Car Club of Boston and the New England Section of the Electric Vehicle Association of America, was held Tuesday and Wednesday, May 19 and 20, in the Engineers' Club, of Boston, Mass.

The papers presented were: "Co-operation" by W. H. Blood, Jr., former President of the Electric Vehicle Association; "Recognition of the Electric" by Hayden

Eames, of the Standard Electric Car Company; "The Electric Vehicle Association" by A. Jackson Marshall, Executive Secretary of the Electric Vehicle Association; "What Constitutes a Good Electric" by A. C. Faeh, of the Rauch & Lang Carriage Company; "Utility of the Electric Vehicle, Pleasure and Commercial" by A. J. Bartlett, Baker Motor Vehicle Company; "Garaging and Service" by J. C. Bartlett, of the Bartlett Garages, Philadelphia; "The Relative Fields of Gasoline, Electric, and Horse Trucks" by H. F. Thomson, Massachusetts Institute of Technology; "Touring by Electric Automobiles" by J. S. Codman, S. R. Bailey & Co., Boston; "Competition, Fair and Unfair" by Vere Shaw, of the Peerless Motor Car Company; and "Weak Links in Electric Truck Salesmanship" by F. Nelson Carle, of the General Vehicle Company.

E. V. A. GROWING

One of the noteworthy achievements in the Electric industry during the past year has been the phenomenal growth and extension of activities of the Electric Vehicle Association. In about six months' time, the membership has been increased over fifty per cent, and the number of sections has increased from two to eight, with the likelihood of fifteen sections being established by the time of the Philadelphia Convention, which will be held three days, October 19, 20 and 21.

The Electric Vehicle will receive a great deal of attention from the National Electric Light Association, the Jovian Order, the Society of Electrical Development, etc., during the coming year, and with the organization of Electric Vehicle interests effected through the Electric Vehicle Association, very great progress is expected in the immediate future.



C. T. Electric Truck Shows Economy in Brewery Service

This is one of eight C. T. Electrics forming the all-motor delivery equipment of the Finkenauer Brewing Company, of Philadelphia. These vehicles show marked economy over former horse methods of delivery, in spite of the fact that business has greatly increased, and they are handling ten per cent more than the horses ever handled.

FINKENAUER BREWERY FLEET MUCH MORE ECONOMICAL THAN HORSES—NO HORSES ARE NOW IN USE

The Finkenauer Brewing Company, of Philadelphia, kept accurate figures for five years on horse-delivery methods, before the present fleet of eight C. T. trucks, built by the Commercial Truck Company of America, was installed. These trucks now deliver the entire output of the brewery, which is greater than ever before, and at less cost. The following are the cost figures from this company, based on operating horses for five years, compared with the costs as based on the operation of the electric trucks for the last three years.

It will be seen that a great economy in favor of the electric vehicles is shown even as a whole, in spite of the fact that the electric trucks have been delivering during the last three years, 10 per cent. more beer than was handled during the period on which the horse figures were based.

COMPARISON BETWEEN HORSE AND TRUCK EQUIPMENT

Twenty-seven horses at \$300	\$8,100.00
Eleven wagons at \$450; three wagons at \$275	5,775.00
Harness, blankets, etc.	1,400.00
Investment	\$15,275.00
Depreciation at 10 per cent.	\$1,527.50
Interest on decreasing investment at 6 per cent. (average 3 per cent.)	458.25
Replacement of horses due to death, accident or incapability (approximately 20 per cent.)	1,600.00
Repairs to wagons and harness (approximately 20 per cent.)	1,155.00
Feed, bedding, shoeing, veterinary attention, medicine, etc., at \$22.80 per horse per month	6,156.00
Stable boss and hostler	1,976.00
Interest on stable investment at 6 per cent. (value \$20,000)	1,200.00
Insurance—fire and liability to persons and property	254.40
Eleven drivers at \$19 per week	10,868.00
Total cost per year	\$25,195.15

Truck Equipment

One one-ton based on 4500 miles per year, or 15 miles per day.

One two-ton based on 9000 miles per year, or 30 miles per day.

Six three and a half-ton based on 4500 miles each per year, or 15 miles each per day.

(Charges directly affected by mileage)

	1-ton.	2-ton.	3½-ton.
Current (including oil) at $\frac{1}{2}$ c. per k.w.	\$60.00	\$140.00	\$115.00
Repairs and renewals (tires and battery excepted)	30.00	70.00	50.00
Maintenance of tires	180.00	270.00	200.00
Maintenance of battery, jars and trays	98.00	182.00	157.00
	\$308.00	\$662.00	\$522.00

Fixed Charges

On eight trucks representing an investment of \$34,305.

Depreciation at 10 per cent.

Interest on decreasing investment at 6 per cent. (averages 3 per cent.)

Seven drivers at \$19 per week and electrician at \$30

Insurance—fire and liability to persons and property

\$13,691.65
308.00
662.00
3,132.00
\$17,793.65

This is a saving per year of \$7401.50 or of 18.8 cents per barrel in favor of C. T. electrics over horses.

A three-ton truck has been bought by the Board of Control, of Des Moines, Iowa, for the Fort Madison Penitentiary, for the purpose of transporting convicts over long distances for farm work.



The Fifteen Hundred Pound Signal Truck

THE SIGNAL 1500-lb. motor truck is built by the Signal Motor Truck Company of Detroit, Mich., to conform with accepted practice in truck construction, no attempt having been made to deviate in any way from proven construction and standard practice. This truck is assembled and uses only standard units made by reputable manufacturers. Production is confined to one model only, and the truck is fully guaranteed on solid tires.

Motor

The motor is Continental $3\frac{3}{4} \times 5\frac{1}{4}$ -in. four cylinder placed under hood in front. S. A. E. rating is 22.5 h.p. It is equipped with fan, water pump and governor. Lubrication is by splash, constant oil level being maintained by pump circulation. Ignition is by Eisemann high-tension truck type magneto, with fixed spark. Cables are housed in fibre conduit. Stromberg truck type carburetor, with hot air intake from exhaust pipe is used.

Cooling is by built-up truck type of radiator having vertical tubes with fins in the cooling section, the section being made by the Long Manufacturing Company. Top and bottom tanks and side columns are of motor cylinder iron castings, and cooling section is easily removable for repair or replacement. Radiator is mounted on dropped front cross member of frame and is unaffected by weave of side rails.

The gasoline tank has a capacity of 15 gals. and is mounted on the dash. The filler cap is at right side of car, permitting the tank to be filled from the step. The tank is entirely above the motor and will feed the carburetor on any grade that any car can climb. Shut-off cock and sediment trap are well above the floor for easy access to same. This location of the tank being inside of semi-shroud and next to

the motor compartment, is particularly valuable in winter use because of reducing the chill of the fuel, tending to greater economy.

Clutch and Transmission

The clutch is Hartford truck type of 45-h.p. capacity and has pressed steel cone 15 $\frac{1}{4}$ -in. diameter with $2\frac{3}{8}$ -in. leather face.



Signal Steering Column, Control, and Dashboard Gasoline Tank

There are six adjustable springs under the leather for keeping the engagement of the clutch permanently gentle. Both the spring load and the declutching load are taken on high grade ball thrust bearings, these being of the grooved race type, races hardened and ground. The declutching bearing is housed in a grease tight case which does not revolve except when clutch is withdrawn, thus eliminating a great proportion of wear.

The drive shaft is Hartford truck type of $1\frac{1}{8}$ -in. diameter alloy steel, with block and trunnion type joints, blocks, trunnions and couplings are hardened, ground and housed in grease tight cases.

The transmission is Covert truck type, selective sliding gear, three speeds forward and one reverse, high gear being direct through jaw clutches. Gears and shafts are $3\frac{1}{2}$ per cent. nickel steel, heat treated. Main and countershaft bearings are Hyatt high duty with "Standard" journal roller bearing on stud end of main shaft. The

bevel pinion is backed by grooved plate type ball thrust bearing. Transmission is mounted on jack shaft and is provided with torque arm extending forward to centre cross member of frame, end of torque arm being spring supported. This arrangement prevents the imposing of sudden shocks upon the teeth of the transmission gears when starting, prolonging their life very materially.

Drive

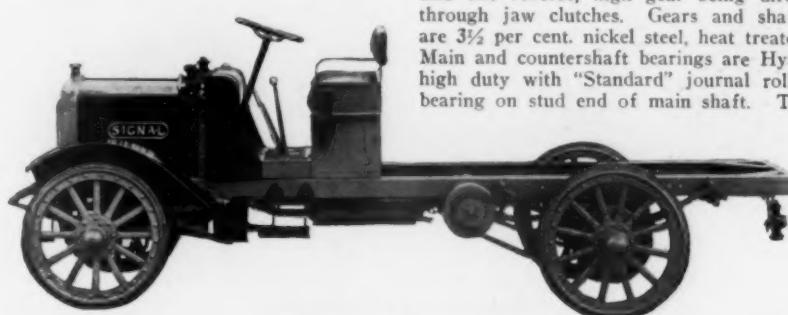
Jack shaft is Russel, and built especially for heavy duty truck service. Gears and shafts are nickel steel properly heat treated and differential and shafts are mounted on Hyatt high duty bearings, the ring gear thrust being taken by grooved plate type ball thrust bearing. The jack shaft floats in hangers rigidly fastened to the frame, and rocks in its hangers in unison with the action of the transmission torque arm. The jack shaft sprockets are of high carbon steel, case-hardened and are removable for replacement. Chains are $1\frac{1}{4}$ -in. pitch, $\frac{3}{4}$ -in. diameter of roll and $\frac{5}{8}$ -in. width between the side plates of links.

Both front and rear axles are heavy duty truck type, of high carbon alloy steel, heat treated and have taper roller bearings and hubs, the hubs having bolted on, pressed steel hub caps. In the front axle the spindles are $1\frac{15}{16}$ -in. diameter in inner bearing and $1\frac{3}{8}$ in. in outer bearing and the rear axle has 2-in. inner bearing diameter and $1\frac{3}{8}$ -in. outer. Front beam is $2 \times 2\frac{3}{4}$ -in. I-section and rear is $1\frac{1}{2} \times 2\frac{1}{2}$ -in. rectangular section.

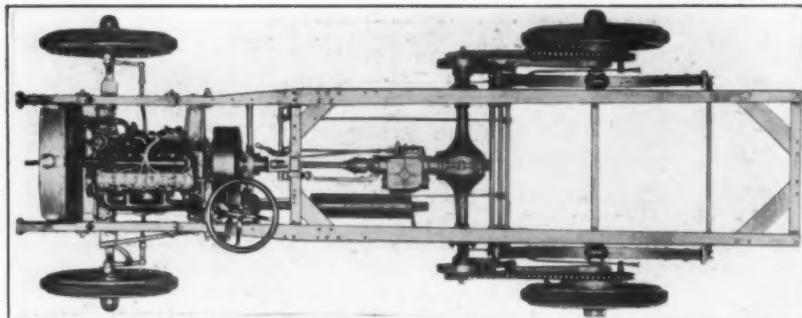
Wheels are selected second growth stock, twelve spokes each both front and rear, spokes are of square section and are $1\frac{5}{8}$ -in. square in front and $1\frac{3}{4}$ -in. square in rear, felloes being fitted with S. A. E. bands for demountable tires. Tires are solid, the truck being fully guaranteed on these and are S. A. E. standard, demountable, of the best standard makes, $34 \times 3\frac{1}{2}$ -in. front and $36 \times 3\frac{1}{2}$ -in. rear.

Frames, Springs and Brakes

Frame is special alloy pressed steel of $3/16$ -in. thickness of stock and is $4\frac{9}{16}$ -in. deep, throughout its length except at front end. Side rails vary from $1\frac{3}{4}$ -in. width at motor arms to $3\frac{1}{4}$ -in. wide at centre cross member, tapering to $2\frac{1}{2}$ -in. wide at rear end, and are inswept forward to shorten turning radius. Both the centre and rear cross members are $2\frac{1}{2}$ -in. wide and full depth of frame and are braced by extra long gussets at both top and bottom.



Side View of Signal Chassis



Plan View of Signal Chassis

Springs are made by the Detroit Steel Products Company and are equipped with its lubricating device. Front springs are $2\frac{1}{4}$ -in. wide by 44-in. long and rears are $2\frac{1}{2}$ -in. wide by 50-in. long. The eyes of the ends are fitted with phosphor bronze bushings and oil cups, the hardened and ground shackle bolts being mounted in suspension shackles, the latter being free to oscillate fore and aft. The frame is carried well down inside the springs, resting on heavy round cross bars extending through the lower ends of the spring shackles, this construction permitting an extra low loading platform and doing much toward eliminating side sway, an important factor when large bodies are used. The springs are fastened to the axles by means of heavy clips bent over semicircular clamp plates, thus having no corners to crack through vibratory stress, the tension being taken by double nuts on the clip ends.

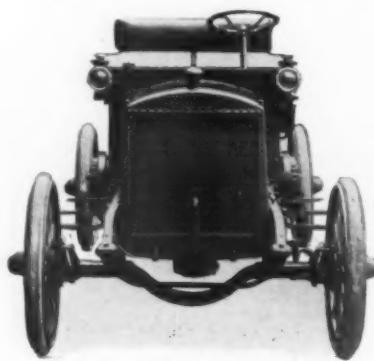
Radius rods, are heavy steel castings of open I-beam section and are adjustable for length by means of right and left hand threaded adjuster at forward end. The rear end is hinged by means of a vertical pin to the rear brake carrier which is free to rock around the rear axle beam, and the forward end is attached to the jack shaft hanger by means of a spherical bearing and cap, thus permitting the radius rod to accommodate itself to all movements of the rear axle and springs. As the jack shaft hangers are rigidly attached to the frame, the frame absorbs all the forward thrust of the radius rods and none of this effort is imposed on the jack shaft itself.

Both sets of brakes are extra large, internal expanding, the service brakes being mounted on the jack shaft and operated by pedal, the brake shoes being $1\frac{1}{2}$ -in. face and 12-in. diameter, faced with asbestos and cam expanded against pressed steel drums, braking effect being absorbed by the frame through the jack shaft hangers. The emergency brakes are mounted on a swiveled carrier on the rear axle beam and are controlled by hand lever, the shoes being $2\frac{1}{2}$ -in. face and 15-in. diameter, and the carrier being hinged to the radius rod, the braking effect is absorbed by the latter.

Control

Steering gear is Gemmer, worm and full sector truck type with 16-in. hand wheel. It is fitted with grooved plate type ball thrust bearings. Driver's position is on the left side, this being the location of the steering gear, clutch and service brake

pedals being at the left and right of the steering post respectively, gas control is by accelerator pedal in floor. Ignition has fixed spark. Gear shift and emergency brake levers are in centre of car at driver's right with shift lever nearer. Ar-



Front View of Signal

Showing driver's position at left, bolted-up radiator and sturdy construction

rangement of levers is such as to permit driver taking his seat from either side.

Wheelbase is 115 in. with 56-in. tread in front and 60-in. tread in rear to permit of full-sized body being mounted low between the wheels. The truck will turn without backing in a street 34 ft. between curbs.

Speeds

The motor is fitted with centrifugal type governor which limits the speed of the car on high gear to 18 m.p.h. maximum. The truck is fully guaranteed on solid tires at this speed. With the governor at this setting, the truck will make 12 m.p.h. on second speed and $6\frac{1}{4}$ m.p.h. on low, the gear ratios being $7\frac{1}{2}$ to 1 on high, $11\frac{1}{4}$ to 1 on

second and 20 to 1 on low, giving a very pronounced increase in pulling capacity in low gear.

Standard equipment is driver's seat with spring cushion and upholstered back, front fenders, running boards, side and rear oil lamps, horn and tools.

A very serviceable line of standard types of bodies has been designed and any of these can be furnished on order.

Loading space in standard bodies is 8 ft. long behind driver's seat by 46-in. wide. Height of body floor when loaded is 32 in. from ground. The floor in front of driver's seat is flat and when specially long loading space is desired, opening can be made under seat permitting loading space clear through from tail gate to dash, of $11\frac{1}{2}$ ft.

The chassis complete in priming coat with driver's seat and regular equipment is listed at \$1400 f. o. b. factory.

THE INDESTRUCTIBLE TRAILER

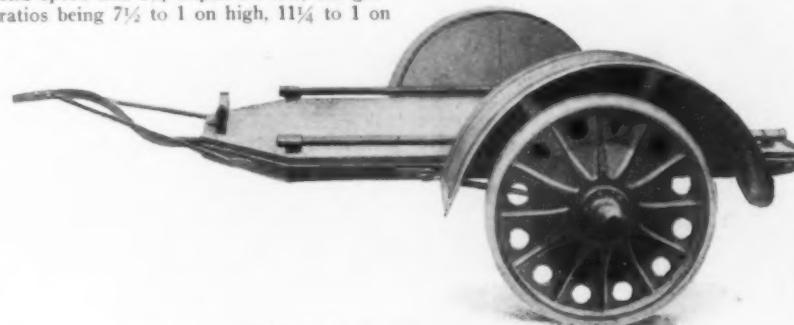
For the automobile owner who has some use for a commercial car, but not sufficient to warrant the purchase of a truck, the Indestructible Wheel Company, Inc., 809 E. Walnut Street, Lebanon, Ind., is producing a trailer with a capacity of 1000 lbs., and a load space of 80 x 39 in.

The solid rubber tired wheels are steel artillery type, fitted with 2 x 30-in. channel or $3\frac{1}{2}$ x 30-in. Q. D. rims. Clincher pneumatic tires may be had at \$37.50 extra.

The tired wheels ride on self-contained cup and cone, combined radial and thrust bearings, outer bearings having $\frac{3}{8}$ and inner $\frac{1}{2}$ -in. balls. Axle is $1\frac{3}{8}$ -in. square steel, with a 5-in. drop, giving a 10-in. road clearance. Spindles are turned on axle which is forged. Springs are semi-elliptic, $40 \times 1\frac{1}{2}$, four $\frac{3}{4}$ -in. leaves. There are tie rods from axle to side of frame.

Frame is $2 \times 2 \times \frac{1}{4}$ -in. angle section, reinforced and well braced at corners. Reach is $1\frac{1}{2} \times \frac{5}{8}$ -in. steel, bolted, braced and well riveted to frame. The hitch can be attached to any frame and comes complete with bolts.

Body is 1 in. thick and $4\frac{1}{4}$ -in. wide oak boards, bolted to frame. Two steel side-rails run the full length of the frame for securing load. The load space is 80 x 39 in. and 18 in. from the ground. Mud guards of 20-gauge fender steel are provided. Body, fenders, etc., are black; wheels are black, blue, maroon or yellow, with striping to match. Regular tread is 56 in., but 60 or 61 may be had. Price, \$125.



Indestructible Trailer

Capacity, one thousand pounds; load space, 80 x 39 in. Price, \$125

THE TWIN CITY TRUCK—ONE TO TEN TONS CAPACITY

THE Brasic Motor Truck Company, 2743-5 Lyndale Avenue, South Minneapolis, Minn., is producing a truck of 1 to 2 tons' capacity, the chassis alone to sell at \$1350.

Power Plant

Under the driver's seat and floor boards is located, transversely of the frame, the power plant, a two-cylinder opposed, four-cycle, water cooled, 25 to 30 h.p., with 5-in. base and 5-in. stroke. The mechanically operated valves are 2½ in., the intake manifold is 1¼ in., and the exhaust 1½ in. The carburetor is a 1¼-in. model D, Schebler, and the magneto a K-W. A 10-gal. gasoline tank is carried on the dash, with gage always in sight of driver. Cooling is by a honeycomb radiator, spring supported, with thermo-syphon circulation, and fan in the flywheel. Lubrication is provided for by a Detroit attachment, chain driven, and having eight feeds.

Drive and Transmission

Power is transmitted from the motor by a 1¼-in. straight line shaft with two Blood universal joints to the heavy planetary transmission, of 2 to 4 tons' capacity. It provides ratios of 10 to 1 on high, 26 to 1 on low, and 62 to 1 on reverse. Final drive is by side chains from the jack shaft. Heavy steel side members, with triple acting joint connection to jack shaft, are provided as torque rods.

The rear axle is 1¼ x 2¾ in. rectangular drop forged, with cup and cone bearings. The front is 1½ x 2½ in. I-beam section, also having cup and cone bearings.

Frame, Springs and Brakes

The frame is 4-in. channel steel, 6½ lbs. to the foot, dropped to front, lowering driver's position. There is also a suspended sub-frame, heavily gusseted and hot riveted.

Springs are semi-elliptic front and rear. Front is 42 x 2½ in., with rear end shackled; rear is 48 x 2½ in., both ends shackled. All eyes are bushed to take 5/8-in. shackle bolts, turned, hardened and



Sandow One and a Half Ton Truck

Continental 4½ x 5½ in. motor; Stromberg carburetor; Brown-Lipe multiple-disk clutch and transmission; Hartford universal joints; Diamond side chains; Hayes wheels, fourteen 2½ in. spokes; Driggs-Scabury 6 x 1½ in. pressed-steel frame; Ross steering gear; Firestone and Swinehart tires, 36 x 3½ in. front, and 5 in. rear; right-side steer and center control levers. Chassis, \$1900, with bodies made to order and extra.



Two-Ton Sandow Truck

Same specifications as the one and a half ton model, except heavier parts. Produced by the Sandow Truck Company, 3751-55 Wentworth Avenue, Chicago, Ill. Price, \$2250

provided with grease cups. Electro Manganese Silica steel is used to give long life.

Service brakes are 2 x 10 in. internal expanding, operated by foot. Emergency brakes are 3 x 14 in. internal expanding on the rear wheel drums, being hand operated.

Wheels are wooden, artillery, 34 in. front and 36 in. rear, with fourteen 2-in. spokes, and solid tires 34 x 3 in. front and 36 x 3½ in. rear.

Other Details

Steering gear is Ross on the right side, irreversible screw and nut type. No accessories are furnished, they being left to the option of the purchaser. The company can furnish bodies as desired, but the standard price, \$1350, is that of the chassis, which weighs 3000 lbs. Speed is 12 to 18 m.p.h., standard loading space is 48 in. wide and 120 in. long. Wheelbase is 104 in. and tread 56 in.



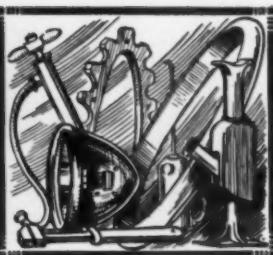
The Twin City Truck—Chassis, \$1350

Capacity one to two tons. Two-cylinder four-cycle opposed motor, heavy planetary transmission, and chain final drive.

The Postal Service of Detroit is now on an all-motor basis. Thirteen horse-drawn wagons have recently been supplanted by four motor trucks. They will be used for hauling mail from the post office to the railroads; the light machines heretofore in use will be used for mail box collections.



TRUCK ACCESSORIES AND APPLIANCES



THE PERFECTION PISTON RING

There seems to be no end to new things, and piston rings are not an exception. The Automobile Construction Engineering Company, of 3324 Ludlow Street, Philadelphia, is sole distributor to the retail trade of the United States for the Perfection Piston Ring, which is the latest in piston ring development.

These rings, instead of being a single piece, are made up of four entirely separate thin steel rings, shown in the accompanying illustration, all of which go in a single piston ring groove. The rings are of soft steel, which it is claimed cannot score the cylinders, and after continued use produces a high polish, not only on the ring itself, but on the cylinder wall. The combined ring is lighter in weight than an ordinary cast iron ring of the same diameter and width. But .001 in. clearance is provided between the ring and the groove, which means that the three openings between the rings have but one-fifth of a thousandth clearance and the same between the ring and groove. This provides an oil film of this thickness at these five points, and owing to this fact it is claimed that the ring is more leakproof than the ordinary type, and at the same time its outward pressure against the cylinder is very much less. It is claimed that tests have shown that a piston in a cylinder can be moved by a pull of from 6 to 8 lbs. when fitted with these rings, against 50 to 70 lbs. when fitted with ordinary rings. This means, of course, from 50 to 80 per cent. less friction, and as the maximum compression is obtained owing to the leakproofness, an increase in power is said to result from their use.

The rings cannot be broken putting them in, as the piston can be entered into the cylinder without compressing the rings by hand, as with the ordinary cast iron ring.

Each section of the rings has an equal



Perfection Rings in Place

The ends of the ring sections can be separated in putting on so the ring does not have to be sprung out of shape over the piston.

spring tension at all points, the outward pressure remaining uniform, it is claimed, during the entire life of the ring. This is caused by the inner edges of the rings which are compressed and tend to open the



Perfection Piston Ring

Made up of four 1-16 in. sections

ring more and more, as the outer edge is worn away and the metal removed. Better lubrication is also a feature. The claim is also made that the rings can be applied without being stretched over the piston head, and are therefore never distorted in putting them on.

The rings are made in sizes from 2½ in. up to 7 in., inclusive, each section of the ring being 1-16 in. in thickness, owing to the fact that the ring is lighter, and particularly because it is broken up into four parts separated by oil films. There is no hammer action of the ring against the sides of the grooves to the piston as with the ordinary type.

The rings list as follows, there being a liberal trade discount:

2½ in. to 3½ in. diameter, inclusive, \$1.2 per section.

3 3-16 in. to 3¾ in. diameter, inclusive, \$.15 per section.

3 13-16 in. to 4½ in. diameter, inclusive, \$.20 per section.

4 7-16 in. to 6 in. diameter, inclusive, \$.25 per section.

Intermediate sizes take next higher list. Sizes less than 2½ in. and larger than 6 in. on application.

SOMETHING NEW IN THE BRAKE-LINING FIELD

The trend of the times among manufacturers who are producing goods of a high degree of merit is to give a consumer more definite assurance of their durability. In line with this policy, the Royal Equipment Company, of Bridgeport, Conn., manufacturers of Raybestos Brake Lining, have announced that this standard asbestos brake lining will be sold with a definite guarantee of one year's service. If it does not give a full year's wear they agree to fur-

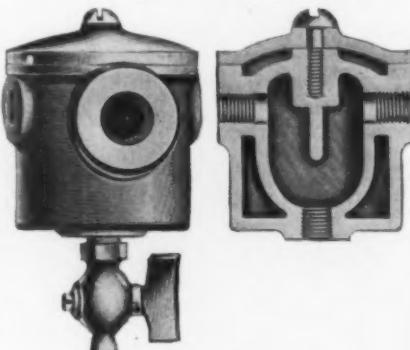
nish new lining without charge. Naturally such a guarantee is looked upon with much more confidence by the jobber, dealer and car owner than mere claims of quality.

An Autocar special body design has been devised for L. Bamber & Co., Newark, N. J., for use in their delivery work. The purpose of this body is to enable the store to promptly and economically deliver small loads of furniture to its suburban territory. With ordinary delivery vehicles, it is frequently found necessary to retard the delivery of two or three pieces of furniture or other similar merchandise until a load of sufficient size has accumulated for each territory; otherwise, when prompt delivery is compulsory, a big furniture delivery van has to be sent on a long run with only a partial load. By the first method, deliveries are delayed; by the second they are made promptly, but at great expense.

This new type of body is divided into two sections. The front section is intended for package delivery, and is separated from the rear section by a screen. The arrangement is such that the position of the screen can be shifted, so as to change the size of either compartment by one, two, three or four feet in length, according to the variation in the character of the load.

THE R. O. C. SUPERHEATER

The R. O. C. superheater, made by the National Economic Supply Company, 1777 Broadway, New York City, is a fuel heater, securing its heat from the exhaust gases. As can be seen in the sectional view presented herewith the fuel is contained in the central pocket, a portion of the exhaust being piped so as to surround the pocket and keep it warm. By thus heating the fuel before it is vaporized, thorough gasification



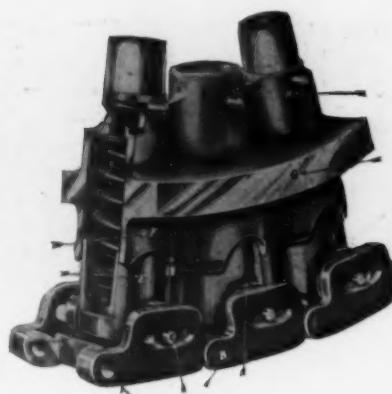
R. O. C. Superheater
Outside view and in section

results; no liquid fuel can enter the combustion chamber. The price of this device is \$5.

ANDERSON SPRING WHEEL

A new type spring wheel for motor-driven vehicles is being placed on the market by Lycurgus Anderson, of Lake Creek, Texas. The wheel, shown in the accompanying illustration, comprises a flexible tread made up of hingely blocks, knuckled together, forming an endless chain that can float with a pivotal motion on roller bearings on the plungers and springs, the means for cushioning any yielding action of the tread blocks.

The endless chain of hingely blocks forming the rim of wheel have recesses for receiving roller bearings, the rims being so designed that pressure of springs on hingely blocks retain each block directly in center of plunger, but allows it to float forward or backward in direction of periphery of wheel or in a pivotal direction, but the piston in the cylinder, by aid of spring and natural compressing of air in cylinder, can cushion any action of blocks



One of the Blocks of the Anderson Spring Wheel

Reference to the letters will be found in the text

der F, and by aid of springs, cushioning any yielding action of block A; F one of cylinders stamped integrally and arranged radially around wheel which encloses plunger and spring; G bead re-enforcing cylinders and forming base to which casing for wheel is attached; H emergency pin which passes through slot in plunger E and will retain same in cylinder F under initial running pressure in case flexible tread becomes disconnected.

THE MALINGS RESILIENT MOTOR WHEEL

A recent addition to this field is the product of the New England Publishing Company, Easthampton, Mass. The primary object of the "Malings Wheel" is the provision of a generally improved "resilient wheel," particularly designed and adapted for use on motor trucks.

The present wheel is particularly distinguished by the provision of an improved driving hub, carrying and supporting the pivotally mounted inner hub member of the "telescoping-spring resisted spokes" and for bracing the latter against lateral circumferential movements between the hub and felloe members of the wheel during operation.

The wheel comprises three portions: the inner portion, or hub; the outer portion, or felloe, and the "telescoping-spring-resisted" spokes extending between and pivotally connected to the hub and felloe portion. As a means for bracing or rein-



Anderson Spring Wheel

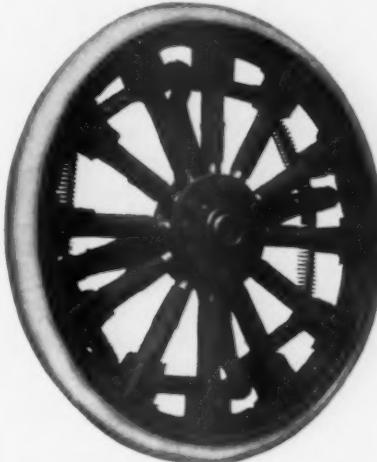
With part of tire removed to show the blocks

forming the rim. The weight carried on any part of rim compresses that spring which causes blocks to float forward, uncushioning springs ahead of center of weight which increases resiliency at point of rim where shock is received, but in order for rim to contract at one point, float and expand at two others, it must contract at a fourth, consequently the weight and shock is distributed over the whole wheel, as all springs, plungers and blocks operate in conjunction with one another. The wheel is so designed that it can be constructed entirely of steel stampings practically within the weight and price of any motor-driven vehicle in use to-day.

In the accompanying cut of the block, A represents one of the hingely blocks which are knuckled together forming the endless chain or floating flexible tread of the wheel; B the pin that connects the series of hingely blocks; C the pin that passes through plunger E and forms axis for roller bearings and projects in slot in hingely blocks to retain same in case of disassembling; D the roller bearing upon which the whole flexible tread or rim of wheel float; E plunger radially arranged around the entire periphery of wheel operating in cylinder

forcing the wheel against lateral and circumferential stress, as well as limiting the circumferential movements of felloe members relative to each other while the wheel is in service, the hub member is provided with driving or connecting arms terminating in bearing heads disposed between the outer spoke members, and provided with stop discs arranged in alignment with, and adapted to strike or abut against the adjacent spoke bearing lugs in the event of a very extended circumferential movement between the hub and felloe members, or in case of the breaking of the spring tension or connecting arms to the outer or felloe portion of the wheel.

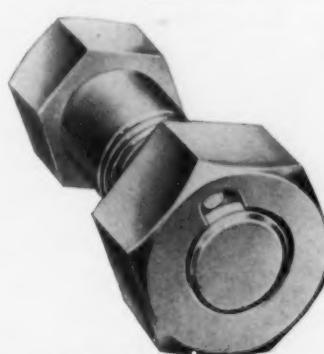
Within the telescoping spokes are helical springs, specially designed to meet the requirements of all cars in regard to strength, weight and resiliency, and the springs are under initial tension at the time of assembling. The load is distributed upon the various spokes and springs, and absolute freedom from noise or rattle is claimed for it. The parts may be readily adjusted and repaired. The hub is made of the parts



The Malings Resilient Motor Wheel

connected by bearing bolts, which also connect and form bearings for the inner hub connected members of the telescoping spokes.

If a spoke or spring should happen to get out of order while in service it will in no way interfere with the continued service of the wheel; it will simply mean that the remaining springs will have a slightly greater load or tension placed upon them, and it will further be observed that any individual spoke or spring may be readily adjusted, or taken out or replaced without interfering with the remaining portion of the wheel.



The Absolute Lock Nut

THE ABSOLUTE LOCK NUT

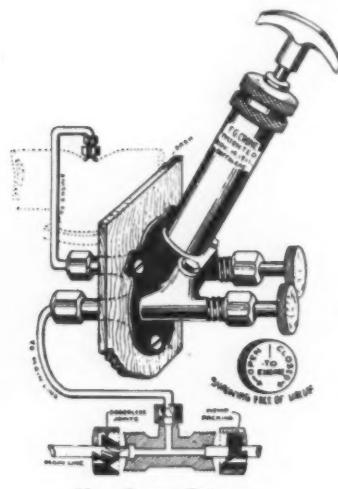
The American Lock Nut Company, Pullman, Chicago, Ill., makes a lock nut operating on a rolling wedge principle, as shown in the accompanying cut. The construction is such that the nut can turn easily when being screwed on, but will not turn the other way unless the roller wedge be loosened by inserting a piece of wire or nail in the slot, when it turns easily. These nuts are made in all sizes and are no more expensive than the ordinary locking device.

A NEW CRONE PRIMER

A new style Crone primer designed to fit in a sloping dash, or in other words the pump barrel, is on an angle, leaning toward the driver, making it more convenient in operating the primer. It is designed so that none of the tubing is exposed on the dash. Some are made with two valves, one to the engine and the other to the gasoline line, as indicated.

By the use of the two valves it makes it positive if either one is shut off, or if gasoline tank has pressure on it, it will prevent piston of primer from rising, and if valve should be on gasoline line engine cannot draw air through the pump barrel and dry up plunger or cause a hissing noise.

The plunger is made of a double cone shape and is provided with self-expanding

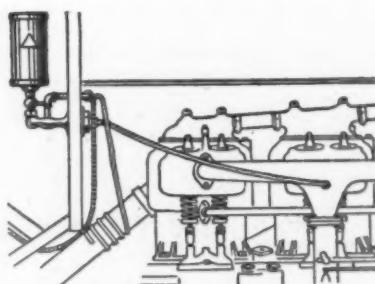


New Crone Primer

plunger which takes up its own wear, and also keeps the plunger tight. This primer is claimed to be advantageous in connection with an electric self-starter, as it saves electric current, as well as lots of unnecessary cranking. This primer draws the gasoline from the main gasoline line. Made by F. G. Crone, 334-6 Genesee Street, Buffalo, N. Y.

THE KRANK-LESS AUTO STARTER AND GAS SAVER

This device, to inject heated air for economy and gasoline for starting into the manifold is being placed on the market by the Sixth City Machine Company, 2360 Euclid Avenue, Cleveland, Ohio. The main part is the reservoir, placed on the dash, and having a valve underneath. This reservoir is connected by means of copper tubing to a nipple in the intake manifold, which also connects to it another piece of tubing whose end is coiled several times around the exhaust pipe of the motor. When the motor is to be started, opening the valve permits gasoline to enter the intake manifold, whence it makes its way to the proper cylinder and is exploded, thus starting the motor. The valve is closed as soon as the operator thinks the charge has reached the engine. After the motor has started, the air in the coiled tube is heated by the exhaust pipe. This



Krank-Less Starter Applied

air is conducted by means of the tubing to the intake manifold, where, entering the mixture from the carburetor, it is said to give greater economy, better and cooler motor operation, and less carbon deposit.

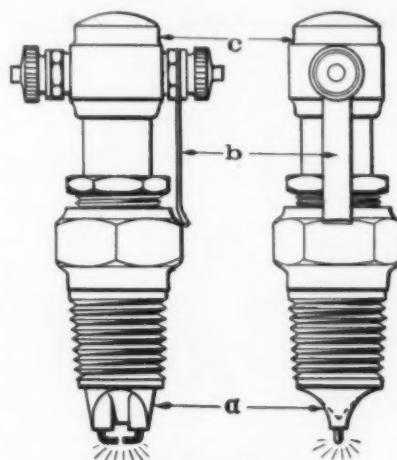
time making the electrodes and connections positively airtight.

It is claimed by the company that this plug will be constructed as a high class article; only the very best of selected materials will enter its construction. The electrodes and sparking points, all in one piece, are made from high grade imported meteor wire. The porcelain, made especially for this plug, is fully guaranteed and is subject to a daily test before assembling. The company has decided for the purpose of quick introduction and large distribution to place the price at \$1 for a limited time.

The construction of the porcelain necessitated making special machinery, which was designed and perfected by the inventor of the plug, M. T. Minogue, of Philadelphia, Pa., the father of two-point ignition as produced by spark plugs. This

A NEW SPARK PLUG FOR TWO-POINT IGNITION

The spark plug herein described possesses many new and novel features and differs in many respects from the spark plugs heretofore offered. The one feature claimed for this plug is the peculiar construction of the nose, or point A, which enters the gases. The insulation is shaped to form a double V, the sides being slightly concave of the larger V, the smaller V being located in the center and terminating at a sharp point a slight distance above the spark gap. Thus, it is claimed, that every explosion cleans the sparking points and end of the insulation; that all foul matter and carbon is thrown off by coming in contact with the concave sides. The insulation is carried to a point very near the spark gap. This is done to prevent any short circuit to the shell of plug in the inside of cylinder, as it is a two-pole plug, the circuit entering by one side, and after jumping the spark gap is carried out the opposite side and reaches the ground by the keeper B. When used in this manner the action is that of a single plug. By removing the keeper the plug has no ground and to use same for two-point ignition, attach wire connection to the side, from where the keeper was removed, and connect to another single plug, thereby getting two absolutely simultaneous sparks in the cylinder. The top cap C is constructed of a special insulating material that will not crack or break, and affords a protection to the porcelain, at the same



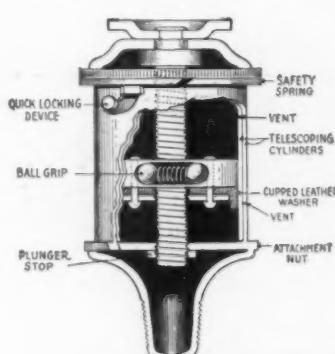
Front and Side View of the Double-Ignition Spark Plug

plug is being manufactured by the Power and Efficiency Company, 137-139 State Street, Trenton, N. J.

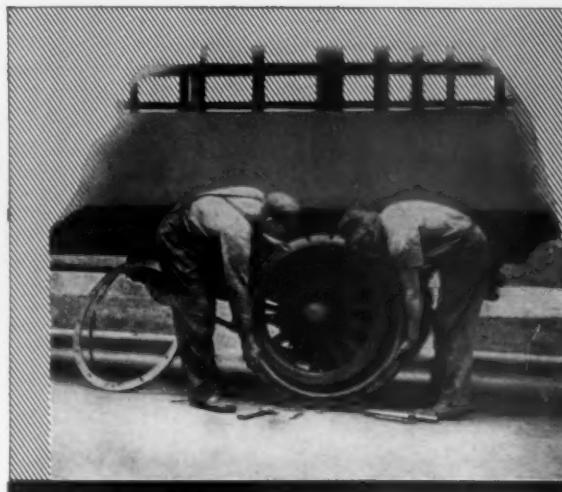
THE CLIMAX GREASE CUP

The illustration shows a new grease cup which has recently been marketed by Wm. J. Bailey, 401-7 Mulberry Street, Newark, N. J. A feature of this cup is the fact that it can be quickly filled. The top is also made so that it cannot drop off, even when the cup is inverted.

A slight pressure downward and to the left releases the inner cylinder for withdrawing it to allow the operator to fill it in his hand, or to fill the outer cylinder in position, if he desires. The cylinders are drawn brass tubing, a close telescoping fit, preventing grease leakage and dust admission. The cylinder caps, die stamped heavy brass, are united to the cylinder by hard silver solder. Air vents in both cylinders are so located that when filling, the air comes out, preventing compression, and making operation easy. When withdrawing the inner cylinder, the air vents prevent a suction and a pulling-away of the lubricant from the bearing. Double ball grip prevents plunger turning and consequently wear. It is produced in standard size shanks, and special sizes may be obtained.



Section of the Climax Grease Cup



Firestone

Removable Rim Equipment

Enables Tire Change to Be
Made Easily and Quickly
Without Removing the Wheel

FIRESTONE Quick Removable Rims are built to S. A. E. Standard. Changes to Firestone Tires are easily made and will result in the permanent profit of quick deliveries, low upkeep, protection to trucks and a thoroughly dependable haulage system.

Wherever we have no service stations, the simplicity and easy handling of the Firestone Rim Equipment is invaluable to truck owners. Drivers

themselves can make tire changes easily.

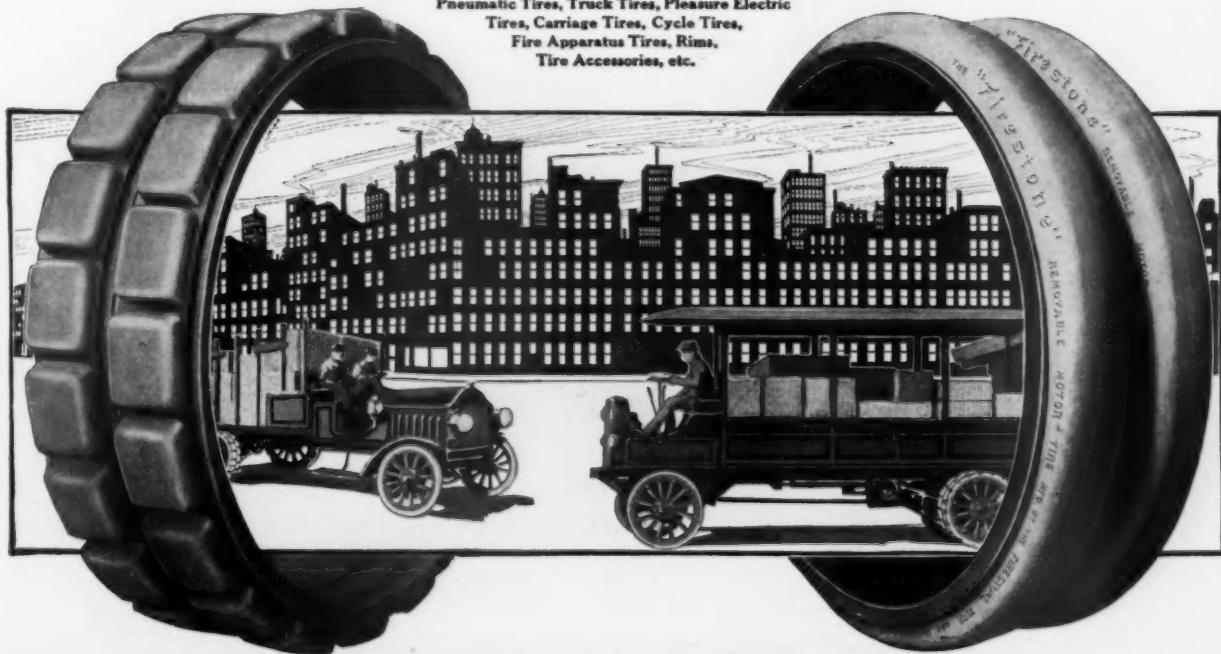
The right tire and rim equipment for every load, road and business need. Prompt, courteous and expert help always on demand—this is Firestone service in all the large cities—everywhere.

Firestone specialists are expert at fitting the equipment to your special need. Let one call and advise with you, or write for catalog.

Firestone Tire and Rubber Co., Akron, Ohio—All Large Cities

"America's Largest Exclusive Tire and Rim Makers"

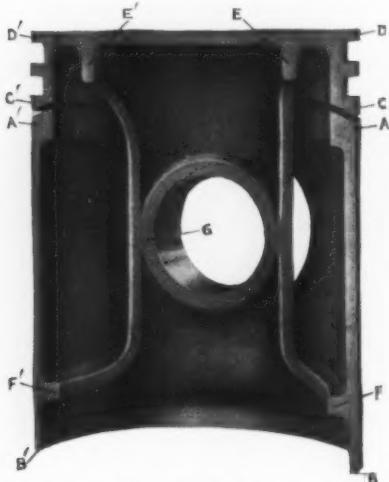
Pneumatic Tires, Truck Tires, Pleasure Electric
Tires, Carriage Tires, Cycle Tires,
Fire Apparatus Tires, Rims,
Tire Accessories, etc.



When Writing, Please Say—"Saw Your Ad. in the C. C. J."

CROSS-HEAD PISTON TO PREVENT SCORED WALLS, ETC.

A new piston is being brought out by the Herschell-Spillman Company, N. Tonawanda, N. Y. It is a cross head and piston combined. The piston is included in that part of our illustration between C and D and C' and D'. It carries the rings, and is finished to a true fit. The cross head consists of that part between A and B and B', this part being connected to the



Section of Cross-Head Piston on What Would be a Longitudinal Section of a Cylinder

other by the cylindrical web EF and E'F'. The cross head is made smaller than the other part, and, although it prevents gripping of the cylinder, it is not loose enough to cause slap. This piston is said to not heat as much as others; the head receives the heat, the heat traveling down the outside wall of the piston to the points CC', where it cannot cross the air gap there encountered. Consequently, it travels down the central web, until it nearly reaches the bottom of the skirt or cross head, and then passes up the outside shell to point AA'. The use of this piston is said to make the motor operate much cooler, and to prevent gas escaping into the crank case. It is also claimed to be cheaper to manufacture.

THE SCHUM BROTHERS NUT LOCK

A departure from the usual methods of lock nut construction is seen in the one illustrated herewith and which embodies

a principle never before seen in theory or practice.

The nut locks automatically at the slightest turn of the nut and takes up all play, therefore requiring no washers. The set screw moves the threads in or out of alignment, unlocking or locking the nut automatically with a click. As the locking member is protected by the nut no parts are exposed to the elements. After the nut is locked the set screw is removed and the hole can be filled with composition to prevent unauthorized parties from tampering, or the hole can be tapped with a bastard thread.

One of the features of this lock nut is that the construction does not weaken the bolt or nut and its tensile, bending and shearing strength are not impaired.

This device has been invented and patented by Schum Brothers, Metropolitan Tower, New York City. Manufacturing rights are now being given.

HANDY CARBURETOR CONTROL—FUEL ECONOMIZER

The Crary Company, 650-52 Woodward Avenue, Detroit, Mich., has brought out a new model automatic gasoline saver, called the Handy Carburetion Controller. The controller body is screwed into the intake manifold and connected with the control

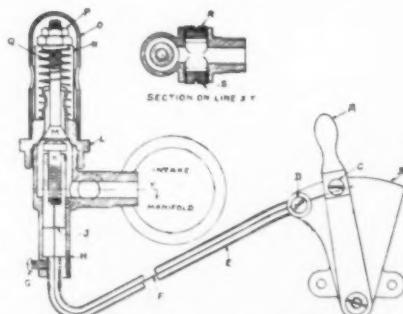
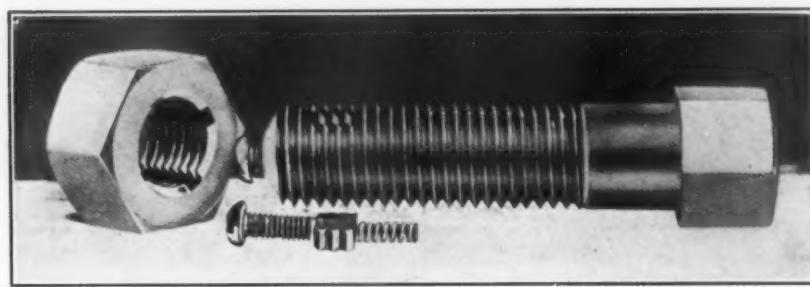


Diagram of the Handy Carburetor Control

lever attached to the steering post by means of a nickelized cable through which runs a coppered piano control wire. A pull of the lever draws the piston away from the valve permitting the suction of the motor to open the valve and draw in air through the air parts. All parts are brass, heavily nickel-plated. The price is \$7.50.



Details of the Schum Lock Nut

TWENTY PALMER-MOORES ORDERED

The Palmer-Moore Company, of Syracuse, N. Y., has just been awarded an order for twenty motor trucks by the Clearing House Parcel Delivery Company, of Boston. This is one of the largest single orders received by any truck manufacturer this year and is considered by the Palmer-Moore officials as concrete evidence that there is a return to improved business conditions this season. The order came as a result of a competitive examination of a number of the leading makes of trucks.

The order calls for the delivery of the first ten trucks in thirty days. The body chosen is a four-post express with wire screen sides and rear screen gate. Roll side and back curtains are provided for inclement weather. On the top of each truck is a special iron rail to facilitate the carrying of carpets, rugs and other household goods of similar nature.

The Clearing House Parcel Delivery Company makes a specialty of general package delivery work in Boston and one hundred and twenty surrounding towns within a radius of 35 miles. At the head of this company is D. B. Strickland, for years the general superintendent of leading department stores in the United States. He first conceived the idea of such a delivery system over twelve years ago, but it is only within the last year that he has relinquished his department store duties to put into actual operation the system he had so long and carefully planned. The clearing house principle in collection and delivery of packages for merchants and storekeepers proved an immediate success, and now at the expiration of the first few months, the new company has over sixty-five motor trucks in active service. The delivery work of some of the leading dry goods houses in Boston is being handled, and the total number of clients runs well into the hundreds. Practically every town in eastern Massachusetts is reached daily, and in many instances two deliveries are made. Four deliveries are made daily to all points in Boston, and in that city a large clearing house is maintained where parcels and packages are gathered together to be immediately routed for city and suburban delivery.

AN ATTRACTIVE MOTOR TRUCK JOB

The Interboro Brewing Company, of New York has long been a successful operator of motor trucks for beer delivery, and one of their latest acquisitions is attracting a great deal of attention in the metropolis. This is a Garford two-ton chassis on which is mounted an especially handsome enclosed body for handling case goods. The Interboro Company recently received its third consignment of Garfords, two five-ton trucks which were delivered March 1, 1914. The brewery now operates a fleet of fifteen Garfords.

B. Altman & Company, New York City, have added two more White trucks to their present force of nineteen.

LARGE HORSE MORTALITY

According to figures compiled by Harvey W. Robinson, of the New York Edison Company, during the year 1913 horses to the value of \$3,101,600 died in New York City. Records in the office of S. S. Goldwater, M.D., commissioner of the Board of Health of New York City, show that during the year beginning January 1, 1913, 15,508 carcasses of horses were removed from the streets in the five boroughs of Greater New York by that department. The horse carcasses removed from each of the boroughs are given separately in the following table:

Borough.	No. Carcasses Removed.
Manhattan	7,079
Brooklyn	5,195
Queens	1,478
Bronx	1,273
Richmond	483
Total	15,508

In the determination of the figure of \$3,101,600 given above as the valuation of the horses which died in New York City during 1913, \$200 was taken as the value of the average horse. Some authorities are of the opinion that this valuation of the average horse is too low, and that \$250 would be a more nearly correct figure. Using \$250 as the basis of determination, the loss due to the horse mortality in 1913 would amount to the staggering sum of \$3,887,000.

According to United States Department of Agriculture reports there is .21 horse per capita the country over. This would give New York, with its 4,776,883 population, 1,001,045 horses, but it is doubtful if the proportion of .21 to 1 applies in the metropolis.

It has been estimated that there were 120,000 horses in service during the year 1913, in the five boroughs of Greater New York, so that the number which died, 15,508, was over one-eighth, or to be exact, 12.7 per cent. of the total number.

That this estimate is too low may be seen when it is considered that no account is taken of the large number of horses which are yearly shipped out of the city to spend their last days on some farm. The figures given only take into account the number of horses which actually died upon the streets or within the city limits. That the horses which are yearly shipped out of New York City to eke out their existence before the plow or wagon upon some farm are of considerable number can be seen by any visitor to the small upstate towns of New York and the adjacent towns of New Jersey. If the number of horses which are yearly shipped out of the city on account of being too decrepit to withstand the pace of work upon the city streets were taken into account, the percentage of horses which yearly become of no value for city work, would be approximately 20. This percentage would agree with the accredited life of five years for a horse engaged in city work.

In the year 1912 there were slightly over 120,000 horses in service in Greater New York, and the number of horses which died during this year amounted to approximately 19,000. The excess of this figure over that of 1913 was due in part to the extremely hot weather which was experienced in the summer of 1912 and in part

THE COMMERCIAL CAR JOURNAL

to the greater prevalence of glanders throughout the stables of the city in 1912.

Horses Getting More Expensive

In the last ten years the price of the horse has increased 143 per cent., while the cost of maintenance, including his feed, harness, barn and hostler service, has kept pace. Nothing which concerns the horse has remained the same except his power and that is the same to-day as it was ten years ago when he could be purchased for a great deal less than he can be at the present date.

When it is considered that \$3,101,600 worth of horses died in New York City alone during the past year, the enormous risk attached to any delivery system in which horses are used exclusively may be understood. If these horses had been sold in time the money received would have been sufficient for the purchase of approximately 1240 motor trucks at an average figure of \$2500 each, and which have an indefinite life.

STANDARD WELDING COMPANY DOES BIG BUSINESS DURING PAST FEW MONTHS

In spite of the fact that the automobile business was not as flourishing as it should have been during the past year there are still many concerns who have not felt any depression in business, as for instance the Standard Welding Company, of Cleveland. This concern during the past few months has been very prosperous.

On that great highway of commerce, The New York Central System, out of the sixth city of the United States, The Standard Welding Company has risen within a few years from the bottom of the list to the

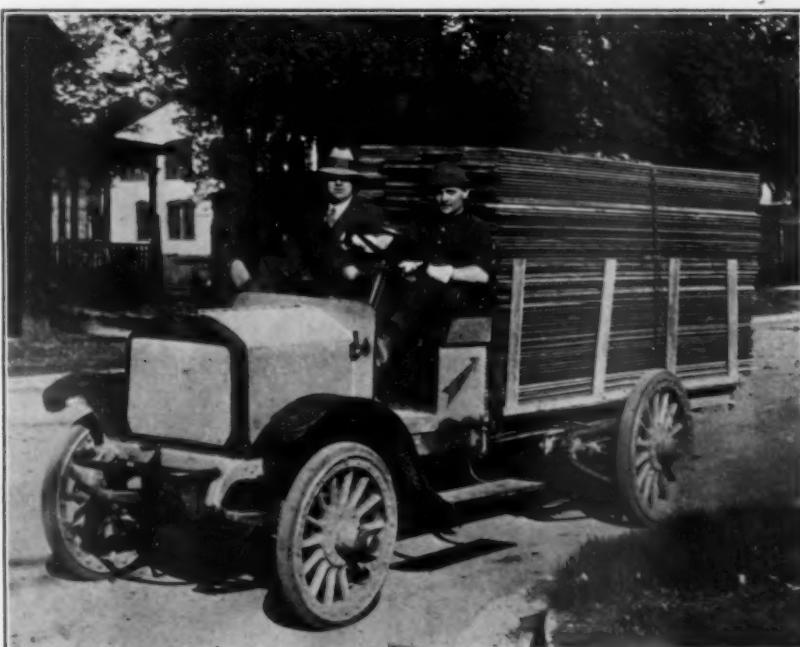
third largest shipper of merchandise in any line. And the railroad sidings built only a few years ago to accommodate enough empties to take care of a week's shipments, to-day are barely sufficient to care for a single day's output. Nearly every department in the immense plant is operating twenty-four hours a day, and the shipments, figured on a basis of twenty-five days per month, total about 100 tons a day. In the steel tubing department which supplies a large part of the bicycle, motorcycle, automobile and kindred industries, the present output is about 2,000,000 ft. per month, with new orders and added facilities increasing each preceding month's total.

About a year ago The Standard Welding Company completely changed its merchandising policy. Previous to that time it sold practically to manufacturers only, but now it sells to the jobbing and retail trade.

NEW AUTOCAR CATALOG

An interesting guide book and catalog, written for the layman as well as the motor truck expert has just been issued by the Autocar Company, of Ardmore, Pa. This booklet takes up in detail the type of body best suited for and used by the principal lines of business all over the country. The booklet emphasizes the fact that motor delivery now occupies a place in the business world where it is not only a big help but a positive necessity.

The Signal Motor Truck Company, of Detroit, organized last September, expects to turn out 400 trucks this year.



Dart Truck Used in Hauling Lumber

This machine has been driven eight thousand miles by the Canfield Lumber Company, of Waterloo, Iowa, at a cost, exclusive of driver and depreciation, of 3½ cents per mile, and has proved much more economical than horses, for the work it has accomplished.

SPEDOLENE



Designed Especially for Gears

TRANSMISSIONS
DIFFERENTIALS
UNIVERSAL JOINTS
TIMING GEARS
WORM GEARS

"The Lubricant That Kills Heat"

When you purchase "SPEDOLENE" lubricant for gears in motor trucks you buy something more than a can or barrel of lubricant. You buy "SPEDOLENE" SERVICE. You buy and you get the best lubricant service that it is possible to secure.

- S will positively eliminate gear noises
- P will not run out or throw out at axle drums or gear cases
- E will not gum
- D will keep the gears cool as well as lubricate them
- O will last longer than any oil, grease or compound
- L has revolutionized the gear lubrication problem
- E has no corrosive action, no fats, grease, acids, lye, soda or water
- N is the most economical and efficient lubricant under any temperature
- E is the greatest and quickest success in the history of lubrication

"Let Your Truck Be the Judge"

USED EXTENSIVELY IN FOREIGN COUNTRIES

DEALERS—Write for Quotations and Other Data You Require. We Need an Agent in Every Town, City and State. Literature Descriptive of Spedolene Gladly Sent You on Request.

CONTINENTAL ASBESTOS CORPORATION

Manufacturers of Asbestos Lubricants, Etc., Spedolene, Journolene, Asbestolene,
Cupolene, Axolene and Gearolene
Worcester, Mass., U. S. A.

"If They'd Only Keep The 'Gas' in a Bowser Outfit"

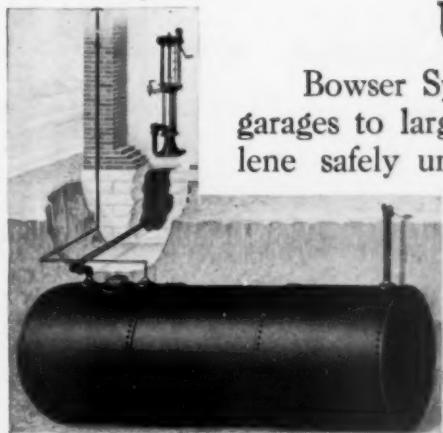


paired delivery service. Store the gasoline in a

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ESTABLISHED 1885

**Underground Gasoline
Storage System**

Then—no more lost power, no lost motion—just efficiency, economy and safety.



Used Everywhere

Bowser Systems are used everywhere from small private garages to large commercial stations. They store the gasoline safely underground, pipe and pump it any distance to garage right into the car. Gasoline can't evaporate, can't be unduly agitated, can't leak, can't be lost in any way—is automatically measured and checked as pumped. The saving will often pay for the system in a few months.

Other Bowser Equipment

This includes Bowser cabinets for storing lubricating oil; self-measuring pumps; portable tanks and De Luxe oil storage equipment. All sizes; all capacities. Easily and economically installed. For particulars of your system, write Bowser. It costs nothing to ask questions and to learn how you can save money and increase the efficiency of your garage.



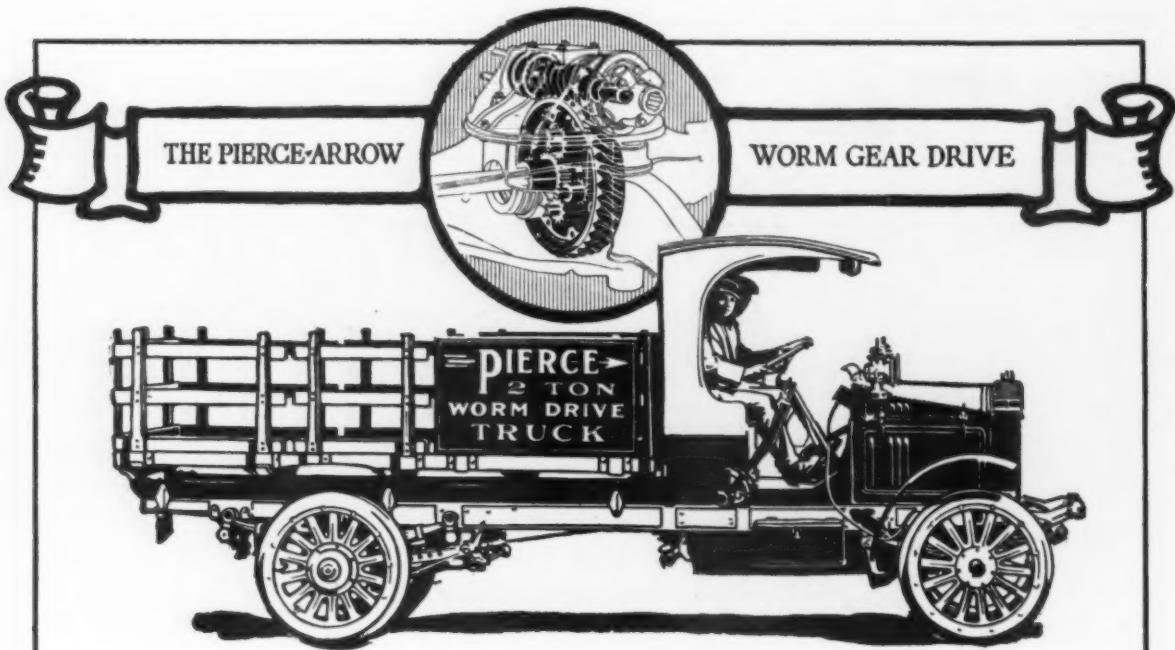
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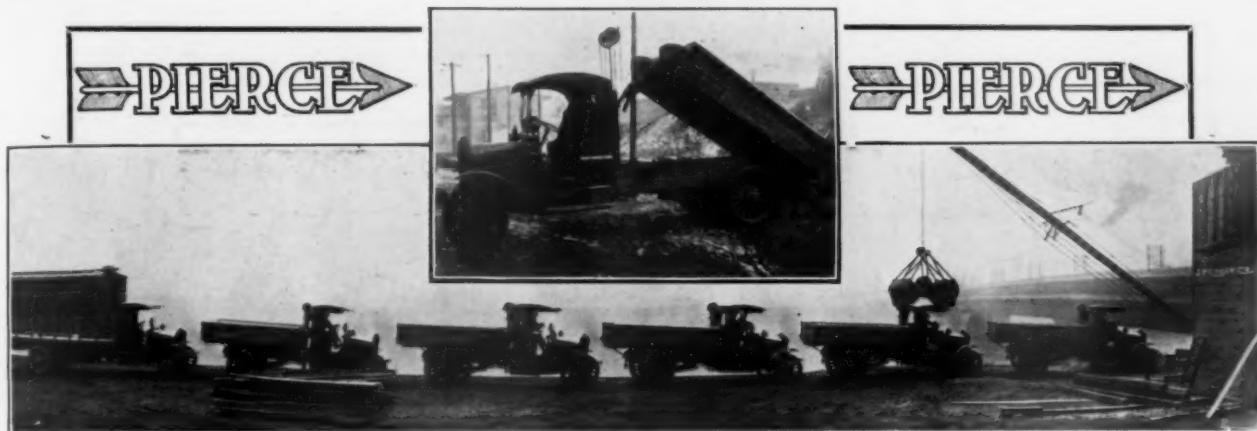
Pierce-Arrow

5-Ton and 2-Ton Trucks
with the efficient worm-gear drive

We are convinced that our advertising would have profited us nothing if we had not insisted upon selling 5-Ton Trucks only for 5-Ton work and 2-Ton Trucks only for 2-Ton work where our representatives have facilities for co-operating in maintenance. Pierce-Arrow advertising merely promises something. Pierce-Arrow sales methods and service stations see that the promise is fulfilled.

THE PIERCE-ARROW MOTOR CAR CO. - BUFFALO-N.Y.

When Writing, Please Say—"Saw Your Ad. in the C C J"



Repeat Order—Six Additional Trucks—April, 1914

The Addition of Six Pierce-Arrow

5-Ton Worm Drive Trucks to our Equipment is due to the Efficient, Economical and in every way Satisfactory Service of the One Truck, purchased from you in June, 1912, and which has been in continuous service since that time.

Yours very truly,

Jno. F. Casey,

April 29, 1914.

Pittsburgh, Pa.



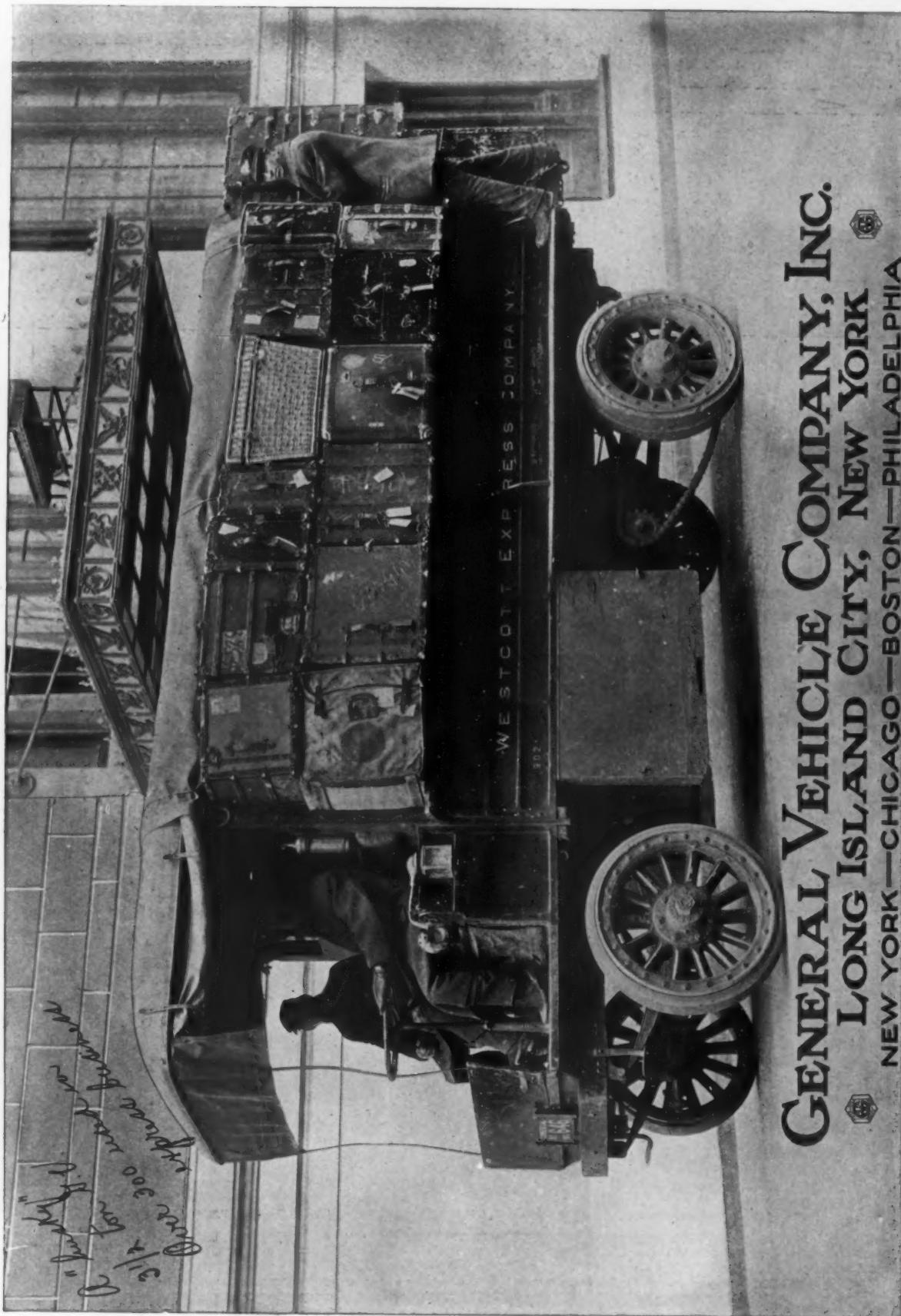
The Big Difference



The Big Difference

THE PIERCE-ARROW MOTOR CAR CO - BUFFALO - N.Y

When Writing, Please Say—"Saw Your Ad. in the C C J"



When Writing, Please Say—"Saw Your Ad. in the C. C. J."

GENERAL VEHICLE COMPANY, INC.
LONG ISLAND CITY, NEW YORK
NEW YORK—CHICAGO—BOSTON—PHILADELPHIA



DANGER!
Watch Your Wheels

SCHWARZ
WHEELS

For Heavy Loads

The wheels must carry the load and you cannot be too careful regarding their strength and safety. To make sure those on your trucks will not buckle, have loosened spokes or run out of true, see that they are equipped with SCHWARZ WHEELS.

The maximum of safety, strength and economy are found in SCHWARZ WHEELS, and they are free from the usual wheel defects and troubles. The distinctive SCHWARZ method of construction makes them different from all others and so superior to them that there is no adequate comparison. Follow the lead of the wise and discriminating men of the trade and put SCHWARZ WHEELS on your trucks. Convincing reasons are given in detail in our booklet, "Bear the Burden." Send for it.

The Schwarz Wheel Company
Frankford Philadelphia Pennsylvania

FEDERAL

Why the Federal in Your Line?

The proven adaptability and efficiency of the Federal in more than 120 different lines, and for more than three years, are, in themselves, sufficient reasons.

The wide distribution of the Federal, from coast to coast, in Alaska, Cuba, Porto Rico, the Philippines, the South American Republics, Australia, Portugal and India, confirms the correctness and soundness of Federal design and construction.

The fact that the largest users of motor trucks in the world operate fleets of Federals.

The fact that when another year rolls 'round, the owner of a Federal will have a truck that will still be backed by one of the most responsible organizations in the industry—a truck that will not have deteriorated in value or desirability, either because the maker has gone to the industrial graveyard, or because the truck itself has been forced to the bargain counter.

Consider these facts carefully, for the *right* motor truck will be of wonderful help in your business; but be sure it is the *right* truck.

Illustrated literature will be sent upon request.

PRICE
Includes Seat, Lamps,
Tools, etc.

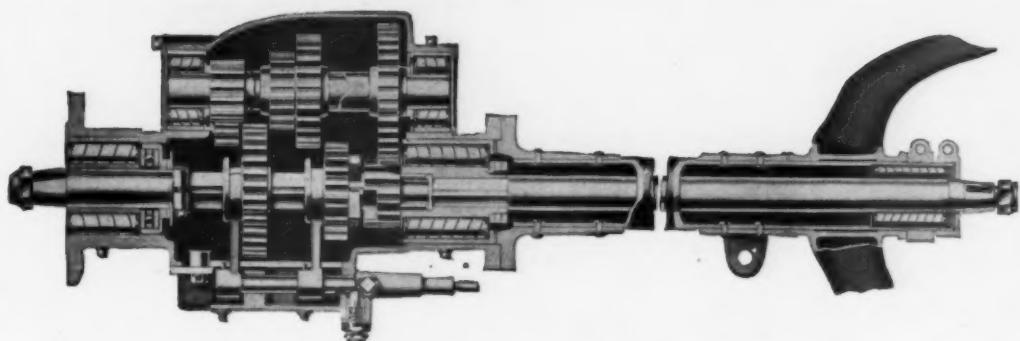
\$1800
F.O.B. DETROIT

Body Extra
Built to meet individual
requirements

Federal Motor Truck Company
Detroit, Michigan.



The Proven Standard
COVERT
Transmissions

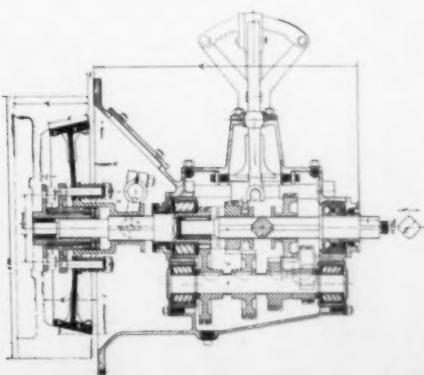


The many years of "satisfaction service" rendered by Covert Transmissions have made them the accepted standard in the transmission field—proven by long and hard use in both pleasure cars and commercial vehicles.

This achievement is the direct result of an unceasing endeavor to give our customers the best in design, materials and workmanship, backed up by a very liberal service policy.

Covert Transmissions are made in various sizes and of the unit power plant, rear axle and jackshaft types, suitable for large or small commercial cars or automobiles. The leading axle manufacturers have made their flanges to fit the Covert construction while the unit power plant models are standardized.

Our engineering department is at your service at all times.



Covert Motor Vehicle Company
Factory: LOCKPORT, N. Y. Sales Office: DETROIT, MICH.

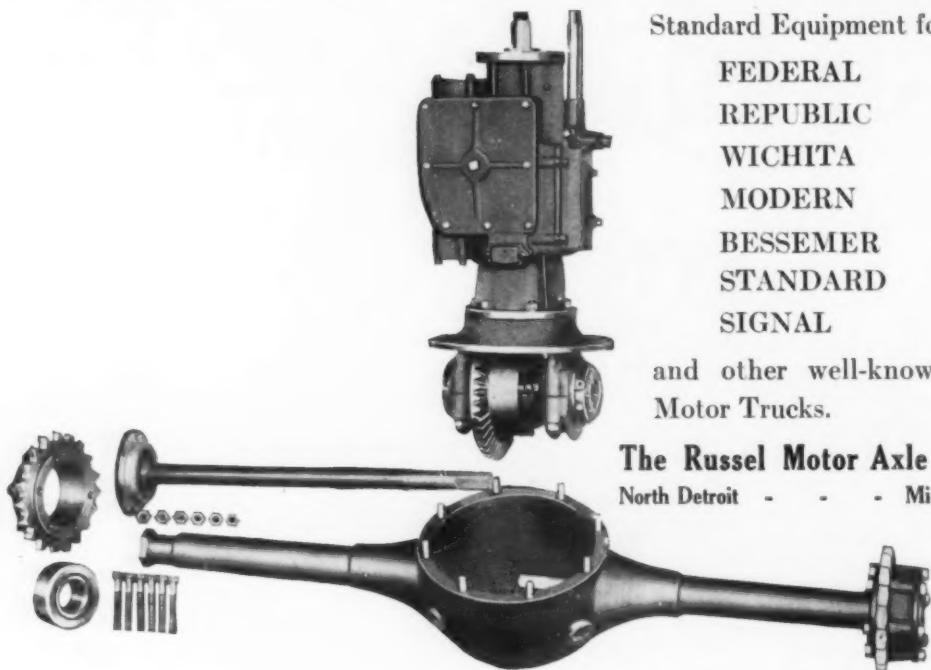
TRANSMISSIONS

RUSSEL JACK SHAFTS

Standard Equipment for
FEDERAL
REPUBLIC
WICHITA
MODERN
BESSEMER
STANDARD
SIGNAL

and other well-known
Motor Trucks.

The Russel Motor Axle Co.
North Detroit - - - Michigan



A Hub Odometer to be Right, should be built like this—

Its drive should be of steel pinions, with worm and spiral gears. Each pinion should be machined from a single piece of steel, heat treated and hardened to resist wear. Do not accept any hub odometer with a drive consisting of thin metal discs. It will fail you. See that the drive is sturdy, well-built and dependable as shown here.

Its dials should be on a special shaft. They should bear large, easily read figures in *miles* and *tenths* of a mile. They should be operated by the Geneva stop mechanism, which securely locks the dials except at the instant of their registering. Beware of springs, pawls and ratchets. They are short-lived and inaccurate. See the picture opposite. It shows the correct construction as employed in the Stewart Hub Odometer.

Your hub odometer should be securely encased in a stout metal shell that will not only resist very rough usage, but that is also *absolutely proof* against the entrance of mud, water, and oil. The proper casing is shown opposite. Remember—your hub odometer *must be protected* against the abuse it will surely get. It should be possible to *seal* it, so that no one can tamper with the records and falsify the figures.

All of these features can *only* be had in the Stewart Hub Odometer, which is shown opposite, complete, as it appears in the hub cap. Do not depend on a less reliable instrument. If you do it will simply be a waste of money. The Stewart Hub Odometer is built to stand the terrific abuse—and to retain its accuracy. It costs but \$15, complete with hub-cap to fit any truck or electric car.



Stewart Hub Odometer

For Trucks and Electric Cars

Stewart-Warner Speedometer Corporation

Executive Offices : 1976 Diversey Boulevard, Chicago
Factories : Chicago and Beloit, Wis.

17 Branches. Service Stations in all cities and large towns

When Writing, Please Say—"Saw Your Ad. in the C C J"

EISEMANN

Just as additional evidence of the continued supremacy of Eisemann Ignition, especially in the motor truck field, we cite the fact here-with that at the last count of the 83 concerns with whom we have contracts for standard equipment, 50 of them were contracts with motor truck manufacturers.

As we have often repeated, this simply bears out our contention, that where efficiency, dependability and durability count most, there you will find Eisemann most firmly entrenched.

In other words, Eisemann Magneto are not only a sales asset, but to the manufacturer of motor trucks who must sell on a cost-of-service basis, Eisemann Magneto are the biggest sort of service asset as well.

So far as the truck field is concerned, the assertion is truthfully made, that no instrument is so particularly adapted as the Eisemann Magneto with automatic spark control. By the very nature of its design and construction, the automatic spark control Eisemann Magneto means more mileage per gallon of gas and oil, and greatly increased life both of engine and car itself.

If you are not familiar with this particular type of Eisemann Magneto, the story will interest you. Won't you send for it?

Fifty Truck Makers
Now Use Eisemann
Ignition.

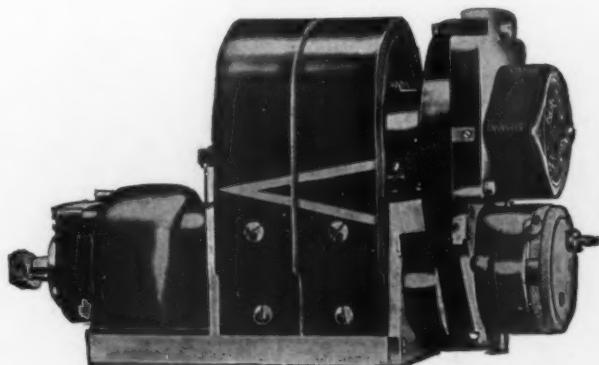
The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N.Y.

New York
123 W. 52d St.

Indianapolis, Ind.
514 N. Capitol Ave.

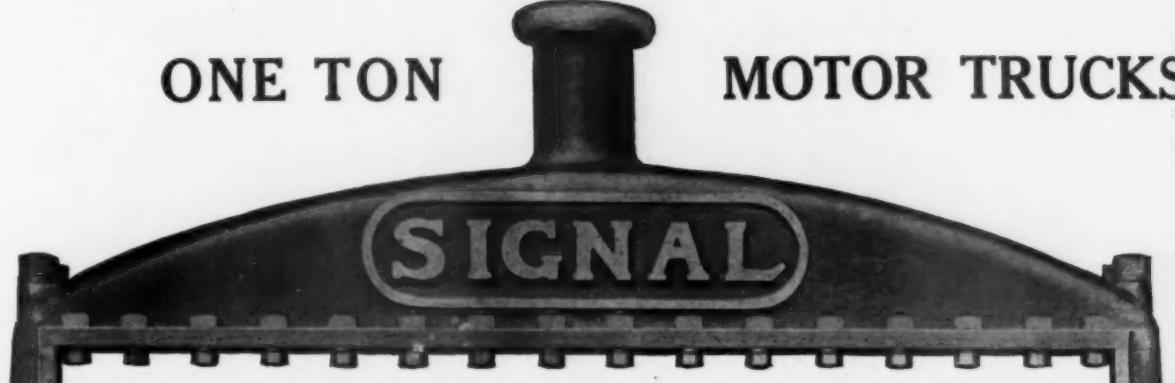
Detroit, Mich.
802 Woodward Ave.



You Will Appreciate the Value of This Construction

ONE TON

MOTOR TRUCKS



DEALERS:—These Nationally Advertised Standard Parts Make Your Sales Easier

Timken Axles and Bearings
Covert Transmission
Stromberg Carburetor

Continental Motor
Hyatt Roller Bearings
Gemmer Steering Gear

Detroit Springs
Russel Jackshaft
Eisemann Magneto

Your customers are naturally greatly interested in the constructional features of the truck you are selling them. They realize that the different units must be the best possible to give them the service they are looking for.

Just think of the selling leverage in the 2000 pound Signal, when you have these well-known and proven parts to form your basis of customer service. You don't have to argue with a buyer about the merits of Timken Axles

and Bearings, Continental Motors, Detroit Springs, in fact every unit that is incorporated in a Signal Truck is recognized as the best in its field.

In addition the size and capacity of the Signal give you the greatest number of logical customers. It is the best solution of their transportation problems.

Write for more detailed information.

Signal One Ton Worm Drive Model, \$1500—Chassis With Timken-David Brown Worm Drive Rear Axle

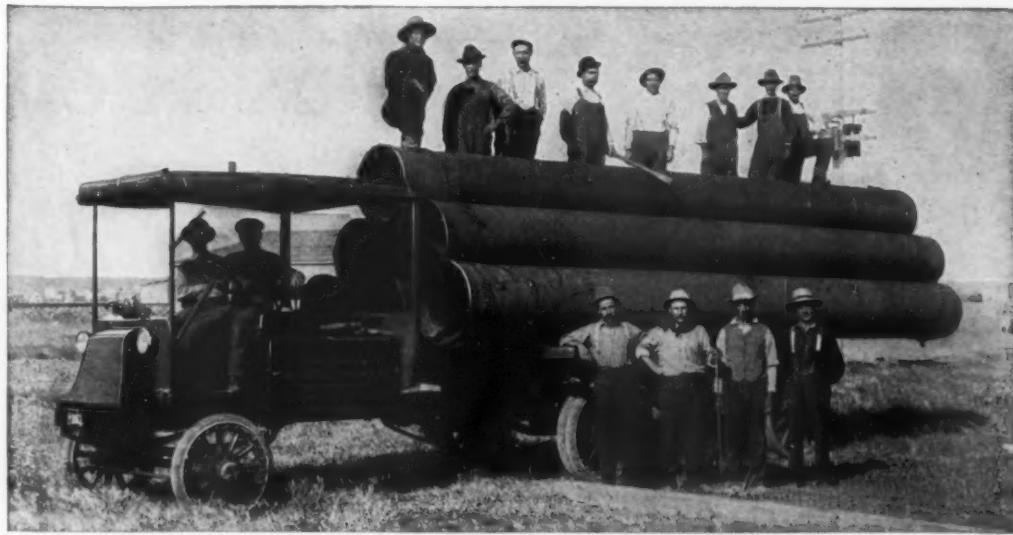
Chassis with
Driver's Seat
and Standard
Equipment
\$1400
F.O.B. Detroit



A Standard Open Express Job

Chassis with
Driver's Seat
and Standard
Equipment
\$1400
F.O.B. Detroit

SIGNAL MOTOR TRUCK COMPANY
DETROIT, MICHIGAN, U.S.A.



This 3-Ton GMC Electric Truck delivers six loads of water pipe per day, six pieces to the load; where formerly one team could only deliver three loads of two pieces each per day. Therefore, the truck is doing the work of six teams.

In municipal and public utility service GMC Gasoline and Electric Trucks have done splendid work.

In road-building, street-flushing, police assignments, electric light work and general hauling, they have well illustrated the big advantage of making the truck fit the service.

This advantage is two-fold—It means first, truck performance that is absolutely satisfactory, and second, the lowest possible operating

expense for the work required.

GMC Trucks are built in both gasoline and electric powers and in capacities from 1000 pounds to six tons—a truck for every purpose.

Wherever there is a municipal or mercantile transportation problem to be worked out, the solution can be found in the comprehensive GMC line.

Further facts from our nearest distributor or direct from the factory.

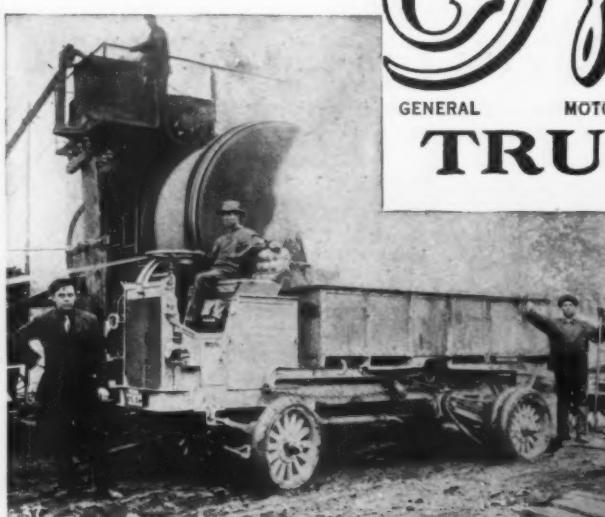
Correspondence invited with dealers of financial responsibility.

GENERAL MOTORS TRUCK COMPANY

One of the Units of General Motors Company
Pontiac, Michigan

Branches and Distributors
Seattle, Los Angeles, Pittsburgh, Minneapolis, Salt Lake, Galveston, New Orleans, Birmingham, Denver

GMC
GENERAL MOTORS COMPANY
TRUCKS



GMC Model KD 5-Ton Automatic Dump being loaded with hot asphalt



GMC Model KD 5-Ton Automatic Dump Truck. The dumping mechanism can be operated while truck is in motion

Republic Dealers

are Money-Making Dealers

Three Main Reasons:

THE RIGHT MODEL

One Ton Capacity---Meeting the requirements of the vast majority of merchants

THE RIGHT CONSTRUCTION

Brief Specifications:

Continental Motor
Schebler Carburetor
Eisemann Magneto
Russel Jack Shaft

Hyatt Roller Bearings
Hartford-Type Joints and Clutches
Culver-Taylor Chains

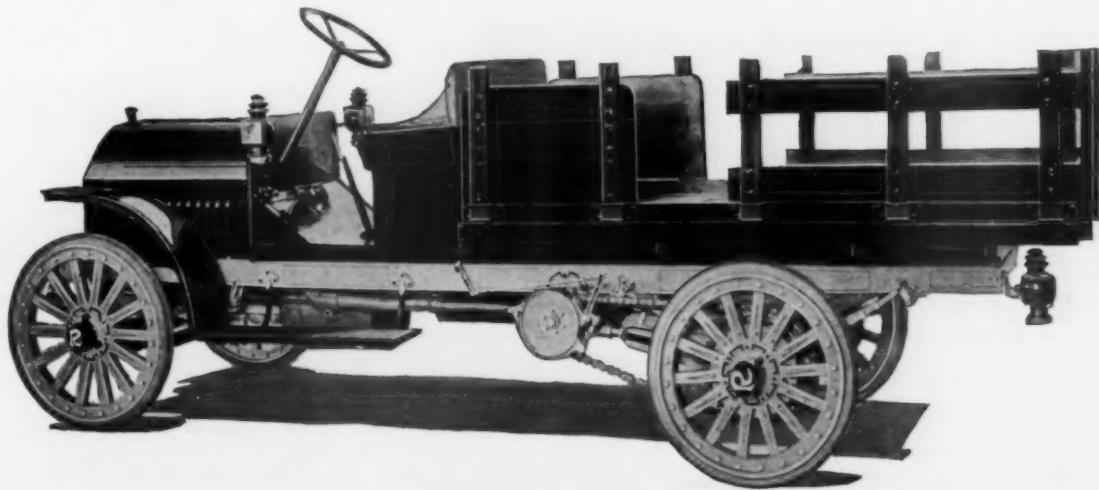
Covert Transmission
Lewis Springs
Left-Hand Drive
Center Control

ALL STANDARD PARTS. THE RIGHT PRICE.

\$1350.00 (Chassis)---Now Recognized as the standard price on dependable one-ton trucks.

There are *many more reasons why* the REPUBLIC is recognized as the foremost one-ton car in the country.

Write us for these reasons and learn why *all Republic Dealers are making big money.*
Catalog, Information and Dealer Proposition upon request.



Alma Motor Truck Company

General Sales Offices, 880 Woodward Ave., Detroit, Mich.

Alma, Michigan



When Writing, Please Say—"Saw Your Ad. in the C C J"



Crown Worm-Drive Motor Trucks

1 Ton—1½ Ton—2½ Ton

A COMPLETE SELLING LINE OF
DEPENDABLE TRUCKS

Responsible, energetic dealers are invited to correspond with us at once. We seek a few more selling representatives—live ones—those who recognize merit and desire to connect with a dependable, lasting and efficient selling proposition.

Crown Worm-Driven Trucks Stand Supreme

Send for complete catalog, terms and detailed information. Write today.

CROWN COMMERCIAL CAR CO.

Milwaukee, Wis., U. S. A.

Factories: North Milwaukee, Wis.

**GEAR
BRONZES**

CRAMP

**BEARING
METALS**

The best motor cars and trucks, those famed for their sturdiness and long service, boast the **CRAMP METALS**. The world's greatest battleships have spread the fame of **CRAMP METALS** world wide. The high standard of precision, accuracy and quality set in these battleships is not approached in any other engineering feats. Everywhere and every day **CRAMP METALS** become a part of some great commercial enterprise, simply because their quality is known. Why experiment? Specify—

"CRAMP BEARING METALS AND GEAR BRONZES"

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, U. S. A.



The MotoKart

Low in first cost

Economical in Upkeep
Efficient in operation

Capacity (Exclusive of Driver), 500 lbs.
Price (Open or Closed Body), \$365.00

The MotoKart Company

Factories: Tarrytown and Peekskill, N. Y.
General Offices: 1790 Broadway, New York City

When Writing, Please Say—"Saw Your Ad. in the C C J"

SIXTY-TWO different manufacturers are now specifying LONG cooling systems.

We have been able to furnish them with exactly the system they wanted and needed.

Our modern factory with its efficient crimping, punching, bending and stamping machinery makes our product uniformly good.

We make all kinds of cooling systems—cellular, honeycomb, spiral tube types, for all kinds of cars, trucks and tractors.

Also hoods, radiators and accessory fittings.

We guarantee to solve your cooling problems.

Let our Engineering Department help you.

Long Manufacturing Co.
Detroit Michigan



LONG




A Big Department Store's Chase Truck Equipment for Suburban Service

"Hard Buyers" Won't Accept Promises

TO them you've got to *deliver the goods*. Therefore, why waste time trying to sell trucks with promises—hard sellers?

"Hard buyers" buy Chase Motor Trucks, because you can produce the goods to make the sale with, *i. e.*, *Owners' Experience*. The Chase Dealer Book gives you Owners' Experiences with Chase Trucks in all lines of business, under all conditions; put down in black and white and signed by the owners.

It shows a buyer exactly how much to expect. It gives him the only safe basis to buy on. It explains why 3,600 Chase Trucks have been bought and used with success by Hard Buyers.

Five efficient Chase models, 1,000 lbs. to 3 ton capacity, \$750 to \$3,300. Write for information regarding open territory. Address Dept. 20.

CHASE MOTOR TRUCK CO., SYRACUSE, N.Y.
Makers of

CHASE MOTOR TRUCKS

Which Truck Is Best of the Famous Big Four?

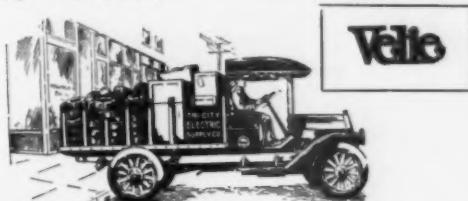
Experienced buyers of motor trucks now choose between four great makes. Each of the four is backed by millions. All are in the business to stay. Among them competition is keen. Almost daily, keenly competitive tests between these four great makes of trucks are establishing which is the best. For all are in use by the largest corporations—who use trucks by the dozen.

In pulling power the Velie Truck, the only one of the big four unadvertised until now, proves that a more powerful, slower running motor will in competitive tests out-pull and out-wear all high-speed, small-powered motors.

In three-ton trucks all four makes have 5 or 6 inch frames—channel shaped, or I-beam. But the Velie in addition to having a 6-inch I-beam frame has a 4-inch sub-frame. And in heavy hauling this extra sub-frame proves its wonderful worth.

Experienced buyers can tell by comparison of specifications why it is that the Velie is winning the fiercely competitive tests between the four best makes of trucks.

Any Velie agent has these truck contest results on file—they are convincing—ask to see them.



Velie Motor Vehicle Company - Moline, Ill.

BESSEMER TRUCK



Three Models

MODEL C, 25 H. P., \$1250
1 Ton Capacity—Chain Drive
MODEL A, 30 H. P., \$1800
1½ to 2 Ton Capacity—Chain Drive
MODEL D, 30 H. P., \$2300
1½ to 2 Ton Capacity—Worm Drive

Fit Every Truck Requirement



Strenuous service has no terrors for the Bessemer Truck. Each truck, before leaving the factory, must go through a test that is 100% more severe than it will ever receive in service. Sturdiness is built into every Bessemer, from radiator to tailgate.

DEALERS:

Write us about a special proposition we have to offer you. The truck that brings re-orders from the largest representative concerns throughout the country, is the truck for you to handle.



**BESSEMER
MOTOR TRUCK
COMPANY
GROVE CITY, PA.**

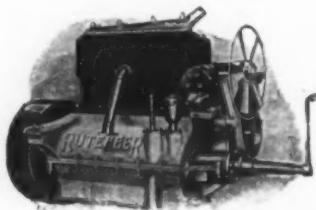
A. C. Vanderpoel, Export Rep.
16 Broadway
New York City

THE RUTENBER
MOTOR

Manufactured since 1901 for high-grade

Automobiles
and
Trucks

3 $\frac{3}{4}$ x 5 $\frac{1}{4}$ four and six cylinder
4 $\frac{1}{4}$ x 5 $\frac{1}{4}$ four cylinder standard or unit and
4 x 4 and 4 $\frac{1}{8}$ x 5 $\frac{1}{2}$ standard types, all L-head, 4-cycle.



Manufacturers are invited to investigate our service and our facilities. Literature on request.

The Rutenber Motor Company
MARION, INDIANA

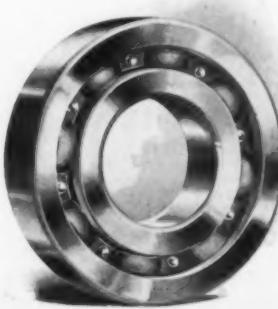
HESS-BRIGHT Ball Bearings

These are the bearings to place in your truck when you want strength, accuracy, durability and service far beyond that ordinarily given.

HESS-BRIGHT stands for that degree of quality for which all others strive.

**The
Hess-Bright
Mfg. Co.**
Front Street and
Erie Avenue
Philadelphia, Pa.

Stores for Retail Distribution
Philadelphia, 666 N. Broad
St.
New York, 1974 Broadway
Chicago, 1800 Michigan Ave.



VIM
LIGHT DELIVERY

**The Car that Proved a Real
Solution of Delivery Problems**

Price, \$635—Capacity, 1000 lbs.

A real commercial car—strong, rugged, durable—of oversize parts and high quality, at a price which makes it available for merchants of every character. Scores of dealers are finding it the money maker of their careers—it may be such for you. Write for information.

The Touraine Co., Philadelphia, Pa.

Plant
where
Vim
Cars
are
made



Capacity
doubled
to meet
demand
of 60
days

When Writing, Please Say—"Saw Your Ad. in the C C J"

Adams Trucks

"Deliver the Goods"

**Greater Values With a Lower
Price—One-Ton Chassis**

\$1850

That the price is lower you will see at a glance.
The increased values are just as easily recognized.

To the thoroughness of Adams' construction, and its marked simplicity of every detail affecting its control and maintenance, we have added these important features:

Continental Motors are now used exclusively on all Adams Models.

Timken Axles and Bearings are used throughout.

Bodies are built, of course, for any trade, on 1, 1 $\frac{1}{2}$ or 2 ton chassis. Adams Trucks are standardized for more than one hundred different lines of business.

We want to hear from wide-awake dealers in unoccupied territory. Write today.

THE ADAMS BROS. COMPANY
438 West Main Cross :::: Findlay, Ohio

First American Truck Manufacturers to use the French type of hood; with radiator at rear of motor. Bodies made in all styles, to suit any industry.

GIBNEY
WIRELESS TIRES

3
YEARS
AHEAD

WHITE STAR MOTOR & ENGINEERING CO.
MOTOR TRUCKS
18-20 HENRY STREET

BROOKLYN, N.Y., Feb. 2, 1914.

The Gibney Tire & Rubber Co.,
245 W. 34th St.,
New York.

Gentlemen:

I have used a set of your tires on my one ton truck for a period of eight months, and they have proved entirely satisfactory, as they have long since given their guaranteed wear.

This truck is driven sixteen hours, seven days each week, and makes at least 75 miles per day. It has travelled therefore close to 20,000 miles and all four tires have worn evenly, and are still good for at least three months running.

Yours truly,
The Sprague Motor Delivery.

E. D. F.

GIBNEY
Tire & Rubber Co.
Factory - Conshohocken, Pa.
Philadelphia . . . New York
Boston . Minneapolis . Detroit
Baltimore . St. Louis . Washington

POLACK

TYRES

INSURE TRUCK SERVICE

Experienced users keep their trucks continually in service by applying Polack European Standard tyres exclusively. Guaranteed for 10,000 miles and invariably run more.

RESILIENT

EFFICIENT

ECONOMICAL

POLACK TYRE & RUBBER CO.

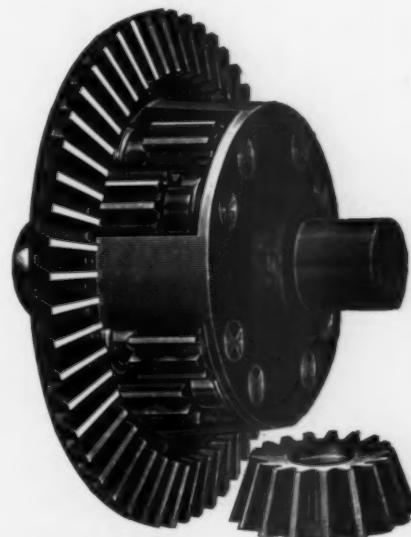
246 W. 59th Street, New York

Albany
Baltimore
BostonChicago
Cleveland
DaytonDetroit
Kansas City
MontrealNewark
New Haven
PhiladelphiaProvidence
St. Louis
WashingtonFactory:
Bridgeport, Conn.

CULLMAN SPROCKETS and Differentials

in stock and to
order.

Send for catalog
and let us quote
you on your re-
quirements.



CULLMAN WHEEL COMPANY, CHICAGO
1351 GREENWOOD TERRACE



WHY
EXPERIMENT
WITH
EXPERIMENTERS?

Cleveland
Worm Gears

ARE BEST
BY TEST

Cleveland
Worm & Gear Co.
Cleveland, Ohio

BUDA
MOTOR
The Part That Sells the Truck

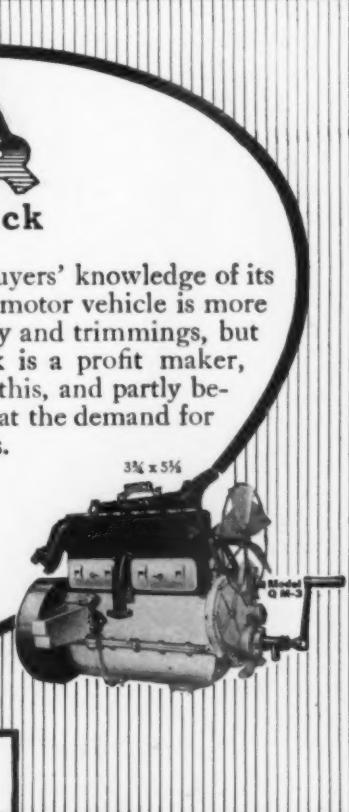
As the Motor Truck becomes an "old story" the buyers' knowledge of its mechanism increases. Today the average buyer of a motor vehicle is more or less an expert. He may be particular about the body and trimmings, but he also insists on being shown the "works," for the truck is a profit maker, not an expense like the pleasure car. It is partly because of this, and partly because manufacturers are gladly recognizing proven merit, that the demand for the BUDA MOTOR grows and grows and grows and grows.

The Unequalled Buda

is being adopted by the manufacturers of some famous trucks who are now completely convinced that The Buda Motor has *no superior* in the whole automobile field, no matter what the price. Both scientific and practical tests will prove this for any interested manufacturer.

THE BUDA COMPANY
FACTORY, HARVEY, ILL. (Chicago Suburb) Address
BRANDENBURG & COMPANY, 1106 S. MICHIGAN AVENUE, CHICAGO
57th and Broadway, New York

Model Q M-3



THE DEALERS' TIME SAVER



Don't waste your time simply reading this ad.

The agency of the *Light Commercial Car* means a saving of time in making sales.

The *Light Commercial Car* is the result of ten years of actual experience in the package delivery business.

The *Light Commercial Car* is a quick seller at \$475.00. It weighs 600 pounds, carries a weight of 800 pounds, makes 40 miles on one gallon of gasoline, and is the swiftest delivery car on the market. The pre-eminent fact is established that the purpose for which this car is designed has been attained, and attained in a definite and unmistakable manner.

If you have read this ad, you will know what to do next.

Wayne
Light Commercial Car
Company, Inc.
1790 Broadway :: New York



When Writing, Please Say—"Saw Your Ad. in the C C J"

IF
Your Motor Truck
Is Equipped With a
Pyrene
TRADE MARK
FIRE EXTINGUISHER
You Can Secure
15% Reduction
In Your Fire Insurance Premiums

Should the premium amount to \$50, this saving will pay for Pyrene the first year. Of course, the reduced rate applies each year while the original Pyrene is good until used. It makes no difference whether your trucks are gasoline or electric, if they but carry Pyrene. Pyrene protects the load as well as the truck. Ask your supply dealer, or write our nearest branch. And when adding to your present fleet, be sure to specify Pyrene.

The Aetna Accident and Liability Co. and the Automobile Insurance Co. of Hartford, Conn., allow this reduction. See their agents or consult your own broker.

At all first-class auto supply dealers. Send postal to nearest branch for booklet—proving the service and true economy this scientific fire fighter brings to you.

Brass and Nickel-Plated Pyrene Fire Extinguishers are the only one-quart Fire extinguishers included in the lists of approved Fire appliances issued by the National Board of Fire Underwriters.

Pyrene Manufacturing Co., 1358 Broadway, New York

Aberdeen, S. D.	Boston	Denver	Milwaukee	Richmond
Alton	Buffalo	Detroit	New Orleans	St. Louis
Anderson, S. C.	Charlotte, N. C.	Duluth	Norfolk	St. Paul
Atlanta		Dixie N. D.	Oklahoma City	Salt Lake City
Baltimore	Cincinnati	Jacksonville	Portland	San Antonio
Birmingham	Cleveland	Louisville	Philadelphia	York, Neb.
Bridgeport	Dayton	Memphis	Pittsburgh	

Pacific Coast Distributors: Gorham Fire Apparatus Co.
San Francisco Los Angeles Seattle
Distributors for Great Britain and the Continent:
The Pyrene Co., Ltd., 19-21 Great Queen Street, London, W. C.

A Sign of an Accurate
Cost Sheet and a
Wise Boss—a

Veeder
HUB ODOMETER



Know the Facts!

There's no use in fooling yourself about the cost of operating your trucks or of letting drivers fool you about the amount of work done.

There is only one way to determine whether your trucks are really profitable and how much they save—and that is to know the facts about their mileage.

The safe, sure and certain way to keep an accurate cost sheet is to place a VEEDER HUB ODOMETER on each of your trucks. They will tell you the whole truth about the work done and enable you to accurately determine whether that truck and driver are profitable or not.

The VEEDER registers forward whether the truck runs forward or backward. It can't be monkeyed with, put out of commission or made to register falsely. It gives the records you want and need. It's a wise boss that puts the strong, rugged, compact, vibration-proof VEEDER on his trucks—for he knows whether or not his service is profitable and what his trucks and drivers are doing.

FORM K
\$20

At your dealers, direct from factory, or the following:

T. H. CRANSTON & CO., 56 E. Randolph St., Chicago.
BERNARD I. BILL, 543 Golden Gate Ave., San Francisco, Cal.

The Veeder Manufacturing Company

C. H. VEEDER, President D. J. POST, Treasurer

H. W. LESTER, Secretary

Hartford, Conn.

Makers of Cyclometers, Odometers, Tachometers, Tachometers, Counters and Small Die Castings

There Is Good Territory Open
for the Sale of

CROCE
MOTOR TRUCKS



3/4, 1, 2 and 3 Ton Trucks

Dealers who are desirous of handling a high-class truck of proved ability that justifies strong arguments, gives complete satisfaction and builds up a business, are invited to investigate the CROCE. It will be found to excel in these very essential factors—quality, economy, efficiency, durability and value.

Consider these points for a moment:

QUALITY—that is proved by the parts used, such as Timken Axles, Wisconsin Motors, Spicer Universal Joints, Schwarz Wheels, Kells Radiator, Bosch Magneto, Brown-Lipe Transmission, Schebler Carburetor, and other equally high-class parts.

ECONOMY—The CROCE distinctive design causes the weight to be one-fourth less than other trucks of similar capacity. This saves enormously on tires and gasoline and makes operation very economical.

EFFICIENCY—In every line of business in which it has been used it has made good. The best proof of this is the fact that we get repeat orders from nearly every customer.

DURABILITY—The CROCE is built so well that it gives long-continued and satisfactory service. The first CROCE built is still in active service after years of usage. The construction is such that every buyer has the right to expect a similar record.

VALUE—There is full value for every dollar in CROCE trucks, and in the long run they are much cheaper than those whose first cost is less.

If these qualities appeal to you as being what you and your trade want, write us for complete descriptions, territory, terms, etc.

CROCE AUTOMOBILE CO.
ASBURY PARK, N. J.

Your Truck Needs Brake Lining That HOLDS

You pay good money for a good truck, put a good load on it, give it to a good man and start it out. The safety and security of the whole outfit depend ultimately on the goodness of the brake lining.



Thermoid HYDRAULIC COMPRESSED Brake Lining - 100%

When brake lining doesn't hold either in critical emergency or regular service, there's a mix-up and a repair bill.

The motor stalls on a stiff up grade. If the brake lining has worn down to a soft center and won't hold the load, what can the driver do but let the truck run amuck down hill?

Again, there's a run down a long hill. If the brake lining is not 100% Brake Lining clear through, and has worn down to the core—the truck may get away, or at least end the down-hill run with a shredded brake lining. Backing up to a platform properly is a nice

enough job to need a dependable brake lining, and even the best of drivers speeds up to get home and may need a reliable brake lining to avoid a street intersection collision or a street crossing accident.

A Good Truck Needs Good Brake Lining

Thermoid is 100% brake lining throughout—not merely on the surface. The center is as good brake stuff as the outside. It wears ribbon-thin but it is 100% effective from one side to the other. Heat cannot destroy it.

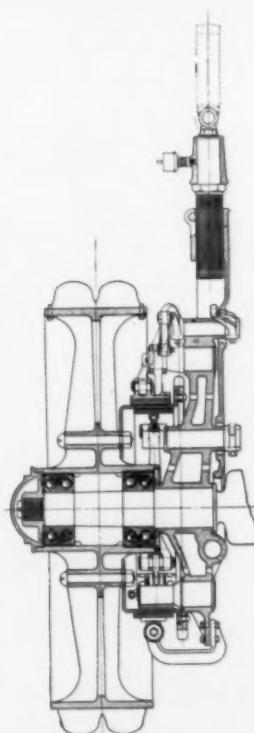
THERMOID GUARANTEE

We guarantee Thermoid will make good—or WE will.

Oil, gasoline, water and dirt do not affect it. Thermoid embodies 60% more labor and contains 50% more material, size for size, than ordinary brake lining. Thermoid gives you more for your money than any other brake lining, in reliability and durability, regardless of price, bar none. We back up the claim with the Thermoid Guarantee.

Specify Thermoid Brake Lining on the truck you buy. Order Thermoid when you reline the brake on the truck you have in service. Dealers and Repairmen are glad to put in Thermoid Brake Lining, for they know it is 100% Good.

THERMOID RUBBER COMPANY, Trenton, N. J.



New Departure Ball Bearings Prove Superior in Trucks

This design of a chain drive rear wheel has been successfully used for several years in motor trucks on all load ratings up to ten tons. It is mounted on New Departure Double Row Ball Bearings. Actual, practical, everyday service has proved this bearing equipment to be superior.

Note the compactness of the bearing unit. It combines two bearings in one, carries a radial load equal to or greater than that sustained by any other bearing and resists all thrust stresses developed by the severest working conditions.

There is an advantage, also, in the fact that it is the ball type of bearing—more completely without friction and therefore consuming less power and requiring less gasoline—economical as well as efficient.

The New Departure is the original double row. The fact that it now has imitators argues for its merit.

The service of our engineering department is freely yours. Send blue print with data as to maximum and minimum loads and speeds and our corps of engineers will recommend the bearing sizes best adapted to your work.

The New Departure Mfg. Co., Bristol, Conn.

Western Branch: 1016-17 Ford Bldg., Detroit, Mich.

Gould Storage Battery

A LEADING firm of lumber dealers in New York City who bought their first Gould Vehicle Battery with a view to economy in transportation costs recently wrote us as follows:

"Yesterday we sent you an order for a new Gould Battery to replace the one still in service on our two-ton truck.

"I take this opportunity of thanking you for the service you gave us on this last battery. Your contract only called for one year, but the battery has seen 19 months' service and has been on the road every working day. This battery was not laid up one day in that time, and we can figure on getting enough mileage for the next 30 days. At that time we will install the new battery. This record is a great credit to the Gould Storage Battery Co. We know of no other battery that would give such service."

60 per cent more service than we promised has made this company a firm believer in the merits of the Gould Battery.

The above performance typically illustrates our conservative policy in rating and in making claims for reliability, durability and general service satisfaction.

Tell us make, model and present mileage of your car if you want quotation on a Gould Battery and advise as to the service improvement possible.

Gould Battery renewals fit jars of any make.

Ask for our booklet, "What Gould Vehicle Batteries Are Doing."

Gould Storage Battery Co.

General Offices: 30 East 42nd Street, New York City

Boston, 14-16 Cambria Street Detroit, 88 East Congress Street
Philadelphia, 613 Bots Bldg. Chicago, The Rookery
Cleveland, 1761-5 East 18th Street San Francisco, 1440 Van Ness Ave.
Los Angeles, 110 East Pico Street

WORKS: Depew, New York

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Canadian Representative: R. E. T. PRINGLE

Full stock carried in all cities where we have offices or agents

107

When Writing, Please Say—"Saw Your Ad. in the C C J."

LEAK-PROOF

is the trade-mark name of one piston ring whose construction is different from all others and protected by patents. This is the appearance of the genuine.

TRADE-MARK REGISTERED



The Name
LEAK-PROOF
Stamped On
Every Ring

PATENTED

Piston Rings

This caution is necessary because some makers, watching the phenomenal success and growth of LEAK-PROOF Rings with jealous eyes, are now offering split rings of various kinds, claiming they are leak-proof.

Many buyers have purchased those in the belief they were getting the real LEAK-PROOF Rings. Not getting the results they expected, they have naturally condemned LEAK-PROOF Rings as being inefficient, when as a matter of fact, they were using substitutes which preyed upon the name, popularity and great efficiency of the real LEAK-PROOF.

LEAK-PROOF Rings are leak-proof because their construction makes them so. That construction is the only sound and logical way to prevent leakage. It is patented and no other maker can use it. Hence, any other construction is a makeshift trying to do what only the LEAK-PROOF Ring can successfully do—completely stop the leakage that takes place with the one-piece ring.

Note the illustration above. You will see it is a two-piece ring. Each piece bears a right-angle flange which completely covers the necessary opening in the other piece. Gas cannot possibly leak through that opening. Oil cannot work up through it to form carbon. Equally important, the points of expansion are opposite each other, giving perfect bearing on the cylinder walls. Leakage cannot take place there. It does with other types of rings. That leakage means loss of power. The oil working up forms excessive carbon. That decreases efficiency. LEAK-PROOF stops both causes of trouble.

When you want piston rings, see that they are made like the above and that the name "LEAK-PROOF" is stamped on them. That assures your getting the power-increasing, money-saving rings.

McQuay-Norris Mfg. Co. DEPT. C. St. Louis, Missouri

BRANCH OFFICES:

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CHICAGO, ILL., 718-719 Michigan Blvd., Bldg., Michigan Blvd. and Washington St.
SAN FRANCISCO, CAL., 268 Market St.
PITTSBURGH, PA., 7620 Tioga St.
KANSAS CITY, MO., 513 New Nelson Bldg.
LOS ANGELES, CAL., 224 Central Bldg., 6th and Main Sts.
CANADA, W. H. Banfield & Sons, 120 Adelaide St., W., Toronto.

CANDLER

"Safety First" is the watchword of successful Motor Truck designers.

An efficient cooling system plays an important part in modern Truck design.

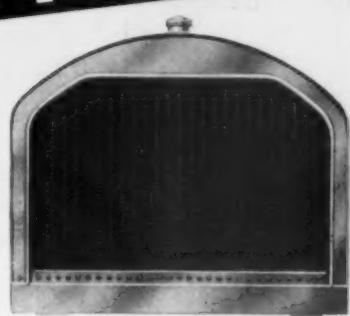
A Radiator that cools under extreme conditions and gives constant service is surely essential.

CANDLER Radiators are particularly adapted to Commercial Vehicles. Their design, construction and ease of repair affords the maximum of strength and efficiency. Added to this is a completely equipped factory, and men with over ten years' experience in the development of successful radiators.

CANDLER Special Radiators are worthy of your serious consideration. Their remarkable performance aids largely in keeping the Truck "Always on the Job."

An opportunity to demonstrate our claims is all we ask. May we have it?

CANDLER RADIATOR CO., DETROIT
"SAFETY FIRST" Radiators



RADIATORS

Hayes Wheels

Our motor truck department is equipped with the latest improved and specially designed machinery, and with an experienced, capable organization, to turn out the best wheels ever made for motor trucks.

Hayes quality is known from ocean to ocean. Hayes Wheels are used, among others, by these leading automobile and truck manufacturers:

Studebaker
Detroit Electric
Garford
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Brown Commercial Car
Chalmers
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Speedwell
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SUBMIT YOUR SPECIFICATIONS
TO US FOR QUOTATIONS

HAYES WHEEL CO. :: Jackson, Mich.



Part of Fleet of 10 Stewarts in the Service of the Buffalo News

Stewart

Delivery Trucks

The satisfaction of Stewart owners is easy to understand when you consider the fact that our sale of repair parts for the past year averaged only \$1.37 for every Stewart truck in service. We can show records of Stewart owners who haven't spent a cent for repairs and whose trucks have never been laid up a day. This, we believe, is a record never before equalled.

Send for our new book, "How Motor Delivery Pays," and information about our money-making proposition for dealers.

Stewart Motor Corporation, Buffalo, N.Y.

T. R. Lippard, Pres. and Gen'l Mgr. R. G. Stewart, Vice-Pres. and Chf. Eng.

R. P. Lentz, Sec. and Treas.

Motor Truck Bands

MADE WITHIN THE FOLLOWING

Dimensional Tolerances

(ADOPTED BY THE SOCIETY OF AUTOMOBILE ENG.)

1.—Tolerance in circumference of felloe band:

	Plus	Minus
Before application to wheel	1-32"	1-32"
After	1-16"	1-32"

Variation from precise measurement shall be uniform over entire width of band.

2.—Tolerance in width of felloe band:

	Plus	Minus
Up to and including 4"	1-32"	1-32"
4-1-16" to 6"	3-64"	3-64"
6-1-16" to 12"	1-16"	1-16"

3.—Variation in trueness of band when placed on surface plate:

Band shall touch at all points within 1-32" up to and including 6" width. Over 6" width within 1-16".

4.—Variation in thickness of band:

.006" plus or minus.

5.—Trueness to round.

The radial tolerance on the wheel when felloe band is applied shall be 1-16" plus or minus. This plus or minus tolerance must not occur at diametrically opposite points. There shall be no flat spots or kinks in felloe band on the finished wheel.

The Standard Welding Company

CLEVELAND
NEW YORK CHICAGO DETROIT

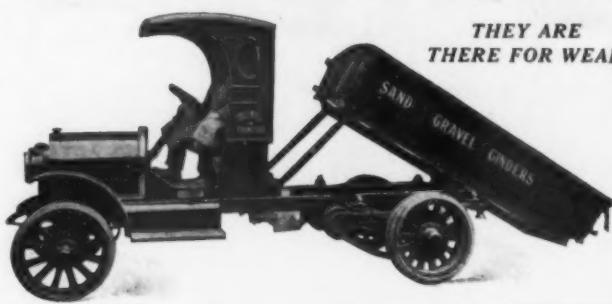
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Our bodies speak for themselves. When you equip your truck with a LITTLEFORD STEEL BODY you have virtually employed another very valuable salesman.

WE CAN MANUFACTURE TRUCK BODIES
TO EXACTLY SUIT YOUR REQUIREMENTS

*Send us your specifications and sizes.
We will quote you attractive prices.*

LITTLEFORD BROS. 453 E. Pearl Street
CINCINNATI, O.



THEY ARE
THERE FOR WEAR

Republic Mileage

The Republic Rubber Company
YOUNGSTOWN

Branches and agencies in all the principal cities.

OHIO

To get mileage you must have quality tires and that is the only kind we make. Of course they cost a little more. That is because they contain the best materials and are the product of the highest skilled workmanship.

One Republic Tire Sells Another

and the man who uses Republics will take pleasure in telling you why. The Republic Staggard Tread is the original non-skid tire just as it is the most effective. Look at the Staggard's patent dates—Sept. 15-22, 1908.

BUCKEYE Motor Truck Jacks

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity	List Price
7	11 $\frac{1}{4}$ "	6 $\frac{1}{4}$ "	18"	16 lbs.	2 $\frac{1}{4}$ tons with formed handle	\$10.00
13	14 $\frac{1}{4}$ "	7 $\frac{1}{2}$ "	20 $\frac{1}{4}$ "	26 $\frac{1}{4}$ "	3 "	15.00
14	14 $\frac{1}{4}$ "	7 $\frac{1}{2}$ "	20 $\frac{1}{4}$ "	33 "	5 "	16.00
9	11 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "	17 $\frac{1}{2}$ "	10 "	1 $\frac{1}{2}$ "	6.00

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THE BUCKEYE JACK MFG. CO., Alliance, Ohio

FRAMES

THE PARISH & BINGHAM CO.
CLEVELAND, OHIO

FRAMES

WE HAVE
MADE DURING
JULY, 1912
TO
JULY, 1913
340,890
FRAMES
OF ALL SIZES
FOR 105
CUSTOMERS

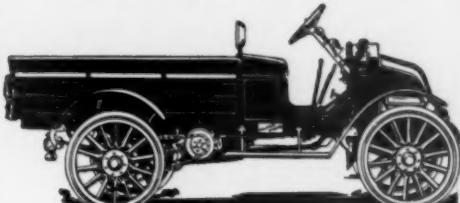
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PALMER MOORE
DEPENDABILITY
TRUCKS

Efficiency and Economy
The Test of Truck Fitness

20 Palmer-Moore Trucks

Just ordered by the Clearing House
Parcel Delivery Company of Boston



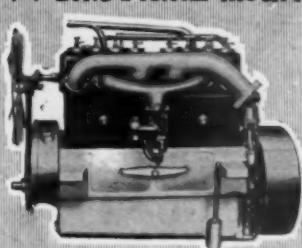
Open Express Body—Price, \$1425

The result of a competitive test to find the truck best suited to meet the exacting needs of parcel delivery work in Boston and 120 surrounding towns.

The Palmer-Moore demonstrates its superior fitness wherever tried. It satisfies every requirement in the light delivery field.

1600 lbs. Capacity. All Bodies
For further information, address Dept. C
Palmer-Moore Company Syracuse, N. Y.

WAUKESHA
4 1/2 x 6 1/4" LONG STROKE TRUCK MOTOR



Strength of construction is not the Waukesha's sole merit. It has the remarkable fuel economy of $\frac{1}{2}$ of a pint of gasoline per horse power per hour. It's a motor with unlimited strong selling features for your truck—because it makes good every promise your guarantee contains.

We'll be glad to send detailed information on request.
WAUKESHA MOTOR CO., Dept. A, Waukesha, Wisconsin

**The
Lavigne Gear Co.**

**Pioneer
Truck Steering Gear
Manufacturers**

FOR

**Trucks, Pleasure Cars
and Tractors**

WE FURNISH OUR GEARS WITH DRAG LINKS
WRITE FOR BLUE PRINTS

RACINE, WISCONSIN

Commerce
DELIVERY CAR

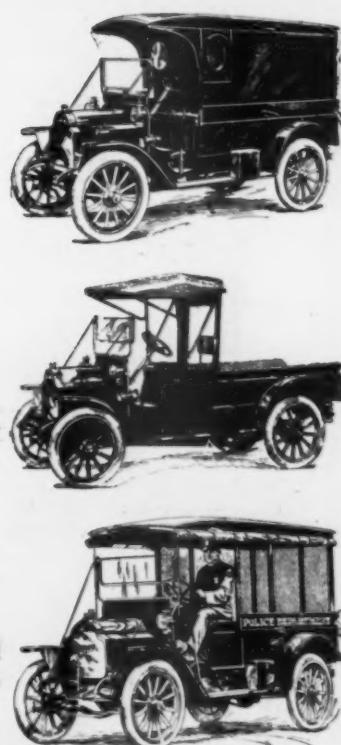
Dealers

Four years strong in the field give us the right to conscientiously recommend this line to you.

Investigate.

\$975
Complete

The Commerce Motor Car Co.
753 Penobscot Bldg.
DETROIT





As a Convenience

Many of the users of B. A. Gramm's Trucks have told us the self-starters were about the best equipment on a motor truck, and that they would not do without them.

But this view alone does not cover the case by any means. With such equipment there is no excuse for the motor being allowed to run during a stop, a source of a very considerable fuel waste.

The self-starter is one of the biggest fuel savers that can be fitted to a motor truck.

Besides this, starting is quick, so there is no time wasted and the machine is ready for instant service in any weather.

B. A. Gramm's Trucks

have quite a number of other built-in features which make them a most desirable truck to operate.

Complete satisfaction is the experience of owners.

Our catalogs will describe these features and tell you of their importance to the truck user. It and other literature free upon request.

THE GRAMM-BERNSTEIN COMPANY

Dept. 1

LIMA, OHIO, U. S. A.

DeKalb TRUCKS

Some Good Territory Still Open for Dealers

Dealers desirous of handling a high-class truck, correctly designed, substantially built, and capable of giving highly efficient and economical service, should investigate the DeKalb. It will stand the most exacting tests and prove itself a truck with which you can make money.

These brief specifications tell the story of DeKalb quality:

Timken Axles	Three-Point Suspension
Continental Motor	Selective Sliding-Gear
Bosch Magneto	Transmission
Stromberg Carburetor	Non-Reversible Worm-Gear Steering Gear
Left Drive	Special Type Cone Clutch
Center Control	Two Ton Capacity
Pressed-Steel Frame	

Our selling organization is being completed, but some good locations are still open. If interested, write for our plan.

DeKalb Wagon Co., DeKalb, Ill.



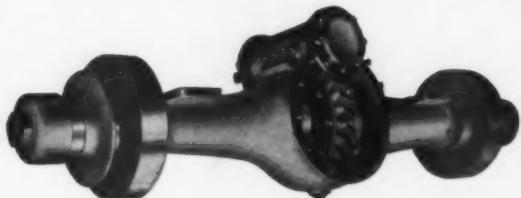
SPLITDORF MAGNETOS—low and high tension—are made in a wide range of models for all manner of work and they'll give your motor more power—make your motor run smoother and quieter than will any other make, and, equipped with one, you can always start your engine on a quarter turn.

We'll exchange your present magneto of any make on a liberal allowance basis for an up-to-the-minute SPLITDORF low or high tension.

SPLITDORF PLUGS are not experimental—they are standard. Known since their first appearance as the "common sense plug" they are exactly that—no more and no less. SPLITDORF PLUGS will outlast your motor—thousands are rarely removed from a cylinder head. There is nothing fanciful about them—they are made to endure any and every strain of ignition put upon them.

SPLITDORF ELECTRICAL COMPANY
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HINDLEY Worm-Gear Axle



**The drive that makes a truck
really efficient and profitable**

The embodiment of this drive in a truck assures longer service, greater efficiency, less expense, lower operating cost.

This is not merely theory, but facts proved by experience. So firmly established have become the advantages of the Hindley Worm-Gear Axle that its presence in a truck is both an assurance of its worth and an argument for its sale.

It is to your interest to inquire about this drive for the trucks you build. The services of our engineering department are at your command.

HINDLEY GEAR COMPANY
1105 Frankford Avenue Philadelphia

Spicer Universal Joints



Universally Accepted as the Most Dependable Flexible Connection Known to Motor Car Practice

Oil-Tight Dust-Proof

PARTS INTERCHANGEABLE

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Don't Experiment With Truck Tires

Testing tires on your trucks is expensive. Equip your trucks with

UNITED STATES MOTOR TRUCK TIRES (Demountable)

They are the tires which you would ultimately choose if you tested every truck tire made.

Branches in all the principal cities.

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For Commercial Cars and Automobiles

We specialize in cold hollow drawing, pressing, forming, coining, punching and stamping parts for motorcycles, bicycles, cream separators, textile and electrical machinery, and for other purposes, to order.

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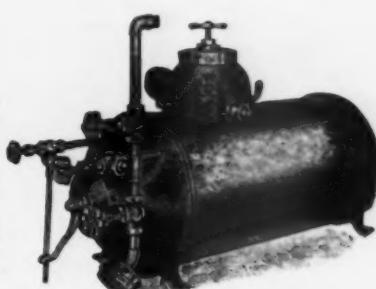
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HAND EXTINGUISHERS and TANKS

of every description for department apparatus. We are equipped to make tanks of any size or type.



3-Gallon Approved Extinguisher



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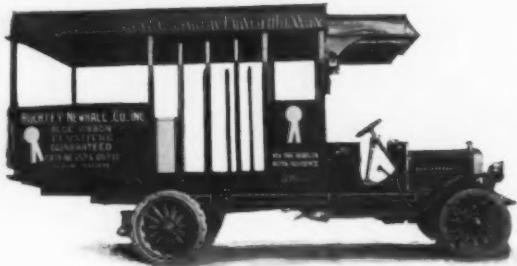


We can equip any chassis complete with body, chemical apparatus, etc. **Ask us.**

O. J. CHILDS CO.

48 Liberty Street
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ROWE MOTOR TRUCKS



are used in every line of business and in every case have proved the most economical means of hauling.

A Rowe Truck will save you money in transporting your merchandise.

The Rowe Truck is guaranteed to give

Continuous Economical Operation

Worm or chain drive. One to five ton capacity

Rowe Motor Manufacturing Co.
Downington, Pa.

ROSS

STEERING and DIFFERENTIAL GEARS

**are standard on good
motor truck
construction**

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ROSS GEAR & TOOL CO.
790 Heath St. :: Lafayette, Ind.

Flint DEALERS LOOK!!

Model "C"
1600 to 2000 lbs. Capacity
DOUBLE REDUCTION
(7 to 1) REAR AXLE



New 1914 Prices

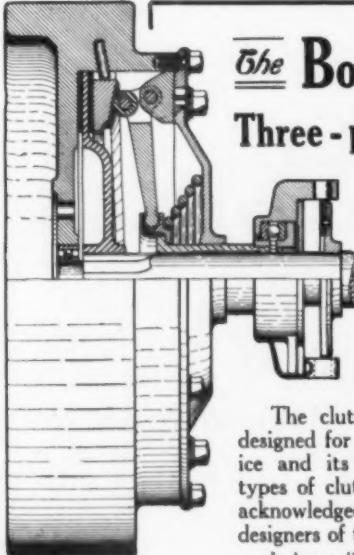
CHASSIS	$\left\{ \begin{array}{l} 34'' \times 3'' \text{ Front} \\ 34'' \times 3\frac{1}{2}'' \text{ Rear} \end{array} \right.$	Solid Tires	\$1285.00
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COMPLETE CAR, Painted and Trimmed, with Body, \$80.00 to \$175.00 additional, according to type of body

Flint Motor Wagon Department
DURANT-DORT CARRIAGE CO.
FLINT, MICHIGAN



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The Borg & Beck Three-plate dry disc Clutch

offers a real
solution of
the clutch
problem

The clutch has been especially designed for truck and tractor service and its superiority over other types of clutch now in use is freely acknowledged by engineers and designers of the highest standing.

It has a light friction disc that will not manifest any drag in releasing. Its engagement is gradual and positive, and it will not out damage.

Truck, tractor and automobile makers are invited to write for complete description.

The Borg & Beck Co.
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A Strong Plug for Heavy Work



You can't expect a brittle Spark Plug to stand the strain and jars of your motor truck. Plugs insulated with porcelain, mica, etc. are bound to break.

HERZ PLUG

"Bougie Mercedes"

is an exquisite combination of STONE and STEEL. It is made to stand up, and it does. Its insulation is

Double Unbreakable Stone

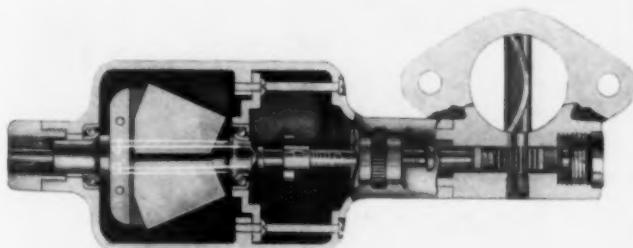
It is Blue Enamelled. HERZ PLUG has Four Sparking Points of Platinum-Alloy, which ensure a fat, hot spark at all times. It is Self-Cleaning and

Guaranteed a Full Year

HERZ & CO., 245 W. 55th St., New York

Makers of the HERZ MAGNETO

THE FAMOUS PIERCE MOTOR GOVERNOR



IN USE BY THE

CONTINENTAL MOTOR MFG. CO.
RUTENBER MOTOR CO.
WISCONSIN MOTOR MFG. CO.
DAVIS MFG. CO., and others

Pierce Speed Controller Co.
ANDERSON, IND., U. S. A.

"Seldens" Are on the Job

"Up to last February my Selden Truck was driven 15,000 miles in about one year. The total expense for maintenance, gasoline and oil, amounted to \$213.67. It was out of service only one day on account of an unavoidable accident. This is a very hilly country and the truck takes Giant's Despair, a hill of national reputation as a climb, with ease. We covered this hill at least once a week."

(Signed) E. J. MORGAN, Wilkes-Barre, Pa.

SELDEN TRUCKS

are economical to operate and maintain because they are designed to carry the load to the best advantage and to stand up under all working conditions. Any man can see where the service is built into the Selden Truck if he will put his rule on the Selden Chassis and compare the measurements with any other 3000-lb. truck.

\$3500 will put the \$2000 Selden Truck into Service and the balance is payable in monthly payments.

We want dealers in open territory. It will pay you to write today for Selden literature and the full details of the Selden Sales Plan.

SELDEN TRUCK SALES CO.
405 East Avenue



Empress BRASS AND STEEL GREASE AND OIL CUPS



PLAIN COMPRESSION
(Patented)

WE MANUFACTURE
a full line of Plain, Leather Packed, Ratchet, Marine, Spring Compression, and many other styles of Grease Cups.

Our line of Oil Cups is equally satisfactory and complete.

Catalogue on Application



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(Patented)

Bowen Manufacturing Co.
AUBURN, N. Y.



Business Expenses Too High

FROM all reports, business expenses are following the cost of living. Volume does not necessarily mean profit any longer.

In order to obtain a satisfactory margin of profit, merchants are compelled to cut corners all down the line. Have you figured your delivery costs lately? It is quite possible that you can make a saving in this department really worth while.

Investigate International Motor Trucks

This half-ton truck, traveling at any speed up to 15 miles an hour, costs much less to keep than the horse equipment required to do the same work. If you are running two wagons, the truck will save you the salary of one driver; if you are running but one wagon, the truck will help to build up your business to the two-wagon volume, by enabling you to reach out into new territory for customers. The first cost is less than that of horse equipment. Up-keep costs less than that for horse equipment.

An International Motor Truck is ready for business any hour of the twenty-four, and it can be handled by any man intelligent enough to learn a few motor truck fundamentals. Write for catalogue and full information.

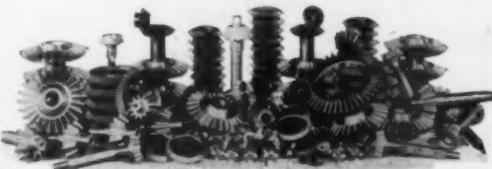
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182 Harvester Building

Chicago U S A

GEARS



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Spurs Spirals Racks
Sprockets

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- (3) Years of experience as specialists in gearing.
- (4) A most careful selection of materials.
- (5) Particular attention to deliveries.

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Gear Specialists
CLEVELAND (Sixth City)

GEARS

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about makers of automobiles,
their parts, accessories, tires,
shop and factory equipment

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Over 1200 separate classifications cover every branch of the automobile industry and tell you every source of supply for any particular article you may wish to buy. It is all given in such compact, accessible form and is so unfailingly accurate that it is known in the trade as

Every Buyer's Buyers' Guide

The big buyers of the industry swear by it. They know from experience what a mine of accurate information it is and how very much time it saves them. These men, with whom "time is money," are the most enthusiastic boosters of the "Directory." It will save time and money for you, too. One issue will prove its value—send for it.

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April issue now on sale. Price per copy - - \$1

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DEALERS: OUR AGENTS ARE MAKING MONEY!

KOEHLER ONE TON TRUCK \$750

GREATEST VALUE AT PRICE—LOWEST PRICE = CAPACITY

Here are brief specifications:
MOTOR, 24 h.p., water-cooled, 4-cycle; IGNITION, single magneto; TIRES, 35 inch, standard removable; TREAD, 38 inches; AXLES, 2-in. rear; BRAKES, 1½ in. front; TRANSMISSION, proved RIGHT by years of use. Gears, genuine chrome-shielded.

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KOEHLER \$750
ONE TON TRUCK

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The Dominating Truck of the One Ton Field

Mr. Dealer: Now about your city or town—is Koehler on it? If not, for the sake of your business, it will be. You or one of your competitors. Whoever handles this truck makes it hard for competitors to sell ANY other truck.

This is a great money maker for dealers because it is the lowest priced ton truck in the market, the greatest value at any price. It is the greatest truck in the market, in simple construction, and does its work in a highly efficient and economical manner. It makes money for the dealer because he can show any merchant that it will save money for him.

DEALERS This is opportunity time for you. Do not hesitate, call or wire, but send at once for our complete selling plan.

H. J. KOEHLER, S. C. CO., 1799 Broadway, New York

KOEHLER ONE TON TRUCK \$750

WILL YOU LET US
GIVE YOU THE
PROOF?

DEALERS



Delivering mileage for a packer—

This 1-ton Kelly truck operated by The Chas. Sucher Packing Company, Dayton, Ohio, is equipped exclusively with

GOODRICH WIRELESS TRUCK TIRES

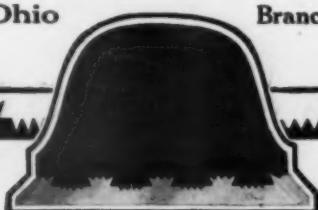
These tires have already delivered over 8000 miles of hard service and are now in excellent condition. Under a wide variety of loads, and in continuous use under varied conditions, they are still wearing well.

What Goodrich Wireless Tires are doing for The Chas. Sucher Packing Company, they will do for you

The B. F. Goodrich Company

Factories: Akron, Ohio

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THE purchaser of any J-M Accessory has a double assurance of satisfaction. The assurance of quality plus the certainty of Service in every important city of North America. Both are backed by the guarantee of a \$5,000,000 concern.



*Imitated—
But Never
Successfully
Duplicated*

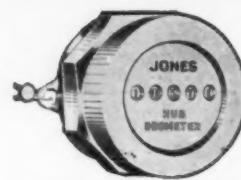
Twelve years of satisfactory service prove the correctness of J-M (Mezger) Soot-Proof Spark Plug construction—also the fact that no plug ever has been so widely copied as the

**J-M (Mezger)
Soot-Proof Spark Plug**

Its double-chamber construction effectively prevents short-circuits due to carbon deposits. Its two-unit design permits the porcelain to be removed from, and replaced in the shell, quickly and easily. It is absolutely gas-tight, emphatically will not leak compression. Part for part, it will outlast any ordinary plug many times. Nothing short of a blow with a heavy instrument can break it. Its porcelain petticoat is heat-proof.

Ask for it by name—that's the best way of making sure that you get it.

Other J-M Accessories:
Long Horn J-M Non-Burn Brake Lining



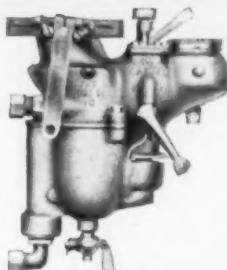
A True Standard of Comparison for Truck Costs

Accurate comparison of your truck costs over different periods gives you definite knowledge of how your truck is standing up in use, and helps you to determine whether it is making or losing money for you. This is only one of the many uses for the

**JONES
HUB ODOMETER**

It keeps tabs on your tire mileage. It makes it easy for you to prove your exact fuel consumption. It indicates any unauthorized use of the truck. In short, it tells you the truth about what your truck is doing.

Made to fit all standard makes of motor trucks. Can be attached in a few minutes in place of a hub cap. In ordering, specify name, year built, and model number or letter. Also wheel diameter and, if possible, actual wheel travel through one revolution. Price \$20.



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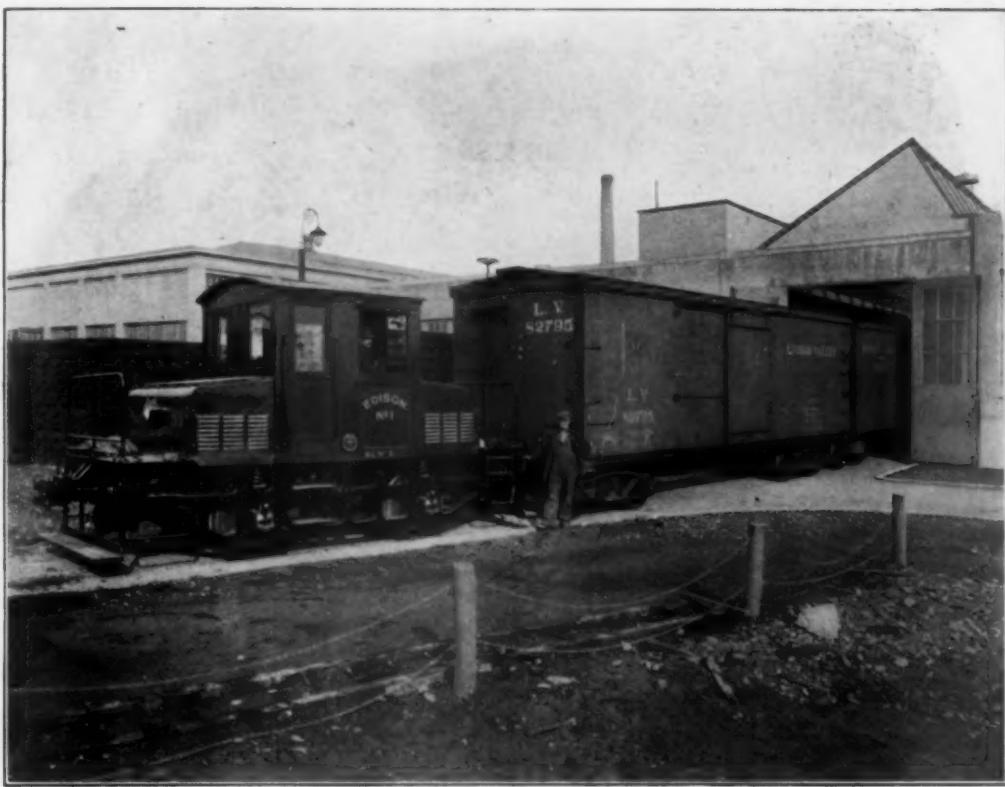
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(2178)

When Writing, Please Say—"Saw Your Ad. in the C C J"



This illustration shows a storage battery locomotive used by the Boston Edison Co. This locomotive weighs approximately 25 tons and is equipped with 48 cells type MV-19

“Ironclad-Exide” Battery

This locomotive is capable of starting, in addition to its own weight and the weight of the battery, a loaded car of one hundred tons total weight on a 3% grade and accelerate same to 1.6 miles per hour in about thirty seconds, and will maintain this speed on a 3% grade for a distance of 600 ft. without undue strain or heating of the mechanical or electrical parts; this being accomplished with a current of about 550 amperes drawn from the battery—nearly 9 times its normal rating.

A battery which will give good service in storage battery locomotives will surely show good results in commercial electric vehicle service. Its durability under adverse conditions was well proved during the past winter. Electric trucks equipped with the “Ironclad-Exide” Battery showed remarkable results in the heavy snow storms which were so severe as to seriously interrupt street traffic.

“Exide” Batteries for continuous, dependable, economical service

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The “Chloride Accumulator,” The “Tudor Accumulator,”
 The “Exide,” “Hycap-Exide,” “Tbin-Exide,” and “Ironclad-Exide” Batteries.
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When Writing, Please Say—"Saw Your Ad. in the C C J"



18,529 Miles a Year

**and Less Than \$1 Per Month
Battery Maintenance**

From Service Report, year ending December 31, 1913, on Edison Battery, Detroit Electric Police Patrol Wagon operated by City of Memphis, Tenn.:

Number of Runs	- - - - -	5,166
Number of Miles	- - - - -	18,529 
Cost of tires, chains, grease, etc.	- - -	\$275.30
Cost of Battery, Solution (Total Battery Maintenance)	- - - - -	11.92 

The Edison Alkaline Storage Battery in this kind of service is guaranteed to be capable of developing **100 per cent** of its rated capacity at the end of **four** years.

Edison Storage Battery Co.
141 Lakeside Avenue Orange, New Jersey

Are You Losing Sales?

Why not close *all* truck prospects by the logical selling plan---

PARTIAL PAYMENTS

Too many truck sales are lost or deferred, because the purchaser wants the truck to pay its own way,—and, therefore, wants to buy on the installment plan.

We Discount Truck Paper to Maturity

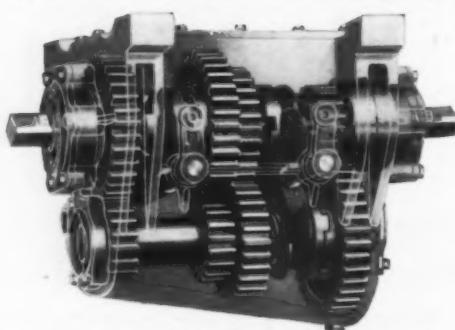
Write us today for Information

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Paid up Capital, \$300,000.00

FIRST NATIONAL BANK BUILDING - - - - - CHICAGO

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Internal View of Shaft-Drive Transmission,
designed for use in worm-drive trucks

For Heavy Truck and Tractor Service Eliminate Transmission Trouble

Selective type, individual clutch system. All gears always in mesh. Countershaft and mainshaft gears idle on direct. Improved speed-changing device. No plain bearings—loose gears mounted on roller bearings.

Write for Bulletin

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814 So. Main Street
Rockford, Illinois

TO make your truck
profitable let us de-
sign a body for you.

We specialize on:

Hand Dump
Side Dumping
Paneled Delivery
Undertakers'
Flare Board
Top Body

BODIES

Send for complete catalogue
standard bodies

Metropolitan Auto & Carriage Co.
Bridgeport, Conn.

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Beginning with the forthcoming issue of July 15th, the

CHILTON
AUTOMOBILE
DIRECTORY

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will have a
flexible leather cover

The new binding will make the book more attractive in appearance, easier to handle, have greater utility and cause it to last longer.

The July issue will be as valuable and accurate as ever and give a complete listing and classification of every branch of the automobile industry.

In no other place and in no other way can the busy buyer find the precise information he is seeking, so quickly, so easily, or so thoroughly and accurately given.

\$1
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The CHILTON AUTOMOBILE DIRECTORY has earned the right to be called an indispensable aid to every quantity buyer. Go where you will, you find it within easy reach of the buyer whose time is money.

Learn to know this DIRECTORY as these men know it and you will never be without it. Place your order now for a copy of the July 15th issue.

Send check, money order or currency to the

CHILTON COMPANY :: Market and Forty-ninth Streets, Philadelphia, Pa.

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These are the drop-forged automobile parts upon which our reputation for quality and service has been built.

Our equipment and facilities enable us to handle the orders of makers of automobiles and cyclecars in the most satisfactory way. We give both quality production and the much desired, but rarely secured, quick deliveries. Let us quote on your requirements.

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Crank Shafts
I-Beam Front Axles
Gear Blanks
Connecting Rods
Cam Shafts
Levers, Etc.



***Better Invest In Construction Than
Spend In Repairs***

The best electric trucks are built to stand ten years' hard service. But the Baker goes still further. Its construction assures not only ten year life. It assures also ten year health. This means uninterrupted service, no breakdowns, infrequent repairs, low cost of upkeep. The little extra money a Baker Electric costs to purchase is saved every year in freedom from repairs and in continuous operation.

We shall be glad to name eight distinct structural points of superiority in the Baker truck, and give a detailed description of each, on request.

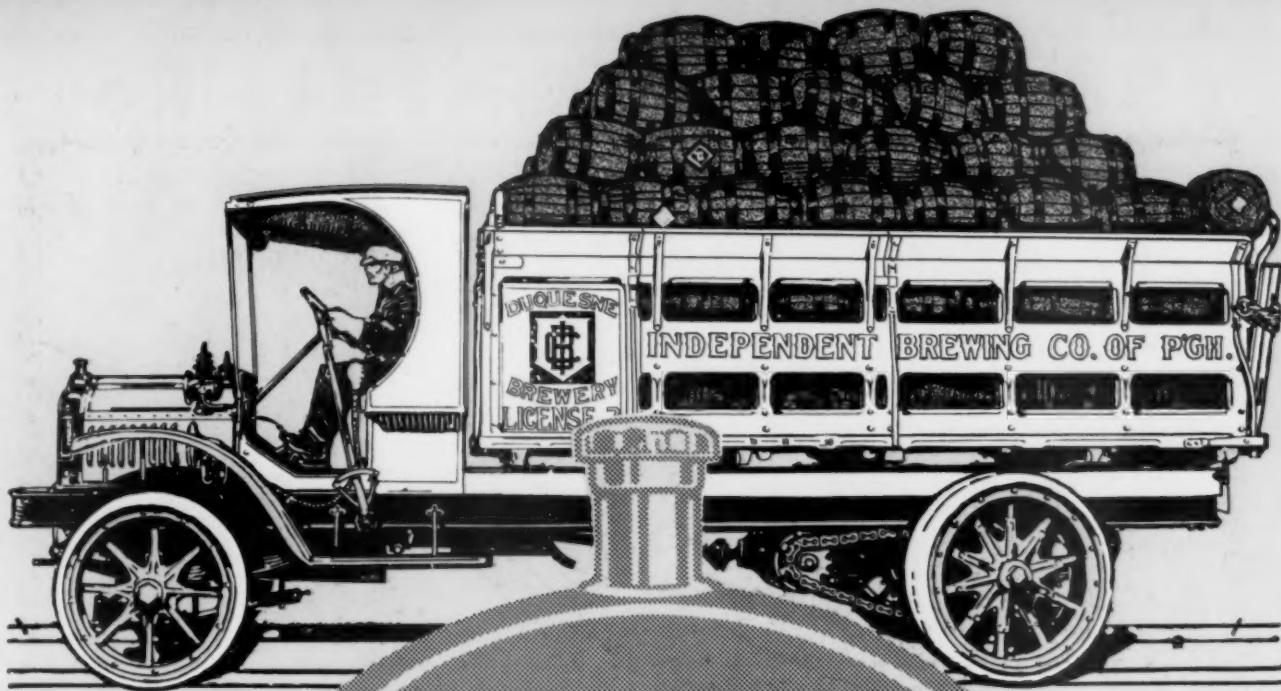
"Electric Trucks Last for Ten Years"

THE BAKER MOTOR VEHICLE CO., CLEVELAND



**Baker
Electrics**

When Writing, Please Say—"Saw Your Ad. in the C C J"



WHITE MOTOR TRUCKS

In the Service of

Brewing and Distilling Companies
and Liquor Dealers

Brewing Companies have always been distinguished by their fine delivery equipment. Before the days of motor trucks the finest draught horses were used by brewing companies to draw their wagons. It is quite natural that this discrimination should continue when these companies purchased motor trucks.

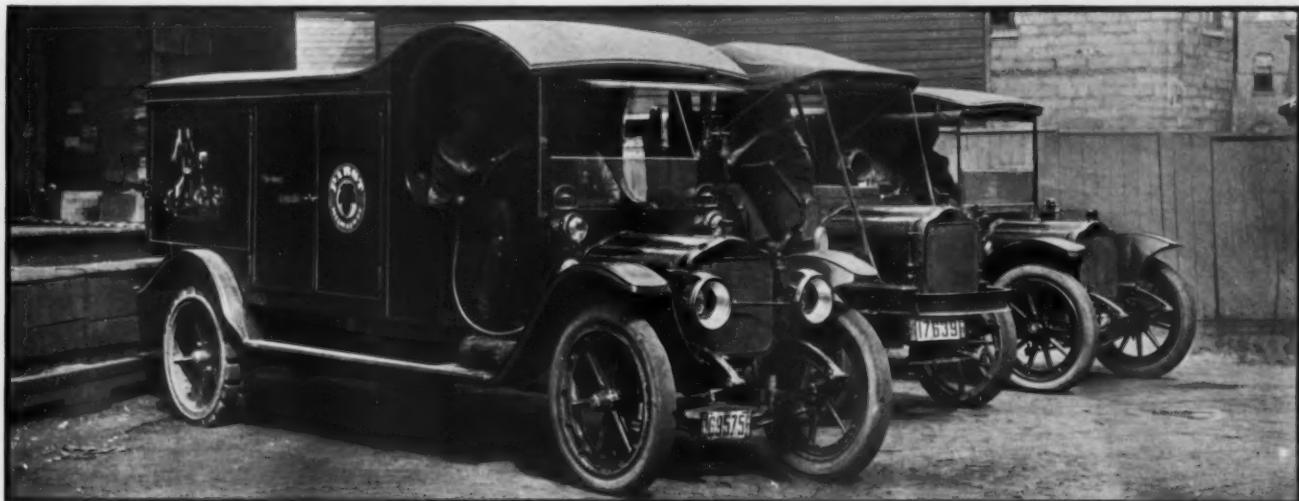
To get the best motor transportation service White Trucks must be used. White owners are assured of economy of operation, durability of construction and dependability—and White Trucks are made by a successful and responsible company.

White Trucks are sooner or later the choice of all discriminating purchasers.

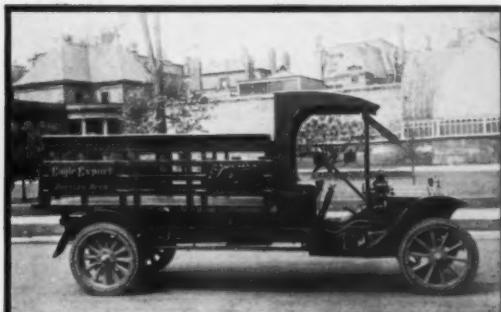
THE WHITE  COMPANY
CLEVELAND

BOTH IN QUANTITY AND VALUE OF PRODUCTION, THE LARGEST MANUFACTURERS
OF COMMERCIAL MOTOR VEHICLES IN AMERICA

WHITE MOTOR TRUCKS



Part of the fleet of White Trucks owned by the Pabst Brewing Company, Cleveland, Ohio



One of the two White Trucks owned by the E. Porter Brewing Company, Joliet, Ill.



One of the four White Trucks owned by the I. Leisy Brewing Company, Cleveland, Ohio



One of the three White Trucks owned by The Kuntz Brewery, Ltd., Waterloo, Ont.

WHITE TRUCKS

Furnish the Most Efficient and Reliable Delivery Service for Brewers

Neither extremes of heat nor cold can affect the efficiency of White Trucks. But during the Summer months brewers lose thousands of horses, killed by heat; and in Winter icy pavements and bad roads reduce the efficiency of their horse-drawn equipment almost half.

Horses can work only a limited number of hours per day, but White Trucks can be operated twenty-four hours per day if necessary.

If your delivery work requires a stable of many horses you will profit by replacing your present equipment with White Trucks. If you are now using motor trucks remember that you have not known the full advantages of motor truck delivery until you have used White Trucks.

Large companies in every line—those who use large fleets of trucks—after experimenting with many kinds, finally buy White Trucks to fill out their fleets.

White Trucks are the logical selection for brewery service where the physical demands are great and where the highest class of equipment is always required.

OWNERS' ENDORSEMENTS

None Better Than White

Three years ago we placed in service two White Trucks, during which time they have received some hard usage. We therefore take this method of expressing our appreciation of the service given and believe White Trucks equal to anything on the market. The proof of which you can readily see from the 1½-ton truck recently delivered to us.

Chicago, Ill.

BERGHOFF BREWING ASSOCIATION

THE WHITE  COMPANY

WHITE MOTOR TRUCKS

Selects White Truck For High Quality

Before we made the purchase of a White 1½-ton Truck we went carefully into the details of specifications of all makes of motor equipment, and finally decided on the White Truck, on account of the high standard of quality used throughout its construction, the economy in fuel consumption and tires, and its easy riding qualities.

Our truck has been in use now ten months, and its total cost for repairs has been \$2.50 for spark plugs.

We are in a position to carry greater loads, get to our destination more quickly, and by giving better service and more prompt deliveries, are securing more business. The truck is very easily handled, and the engine is "fool proof." We average over nine miles to the gallon of gasoline, and our daily trips run from twenty to thirty miles, depending on the number of stops, which average about thirty. The restarting of the engine consequently uses more gasoline whereas if the trips were longer and fewer stops were made, we would average more mileage per gallon.

THORPE & COMPANY, LTD.

Vancouver, B. C.

Satisfaction Brings Re-order

We have been using a White 5-Ton Truck now for the past year and we feel so satisfied with it that we put another of the same kind into our service only a few weeks ago.

We can heartily recommend White Trucks to all brewers or to any other business firms, desirous of getting the best and quickest service, both as to their economy and durability. We also highly recommend your service and inspection departments.

GARDEN CITY BREWERY

Chicago, Ill.

White Truck Makes Profit for Owners

We wish to say that the results obtained from our White Truck are satisfactory, and we are perfectly satisfied. The upkeep has been very low. The repairs very light. We have averaged for the past year, between nine and ten miles on a gallon of gasoline. Our detailed account of the upkeep of the White Truck shows a very handsome balance in favor of motor truck delivery. We would not hesitate to recommend your truck to anyone who is thinking of purchasing a truck, and you are at liberty at any time to refer your prospects to us; it would please us to go into the matter more fully.

We thank you very much for your inspection and your attention to our wants.

THE FIVE SULLIVAN BROTHERS

Providence, R. I.

White Trucks are Efficient and Economical

Our experience with the White Motor Truck has been very satisfactory, and in our judgment, it is one of the most serviceable trucks on the market today; this, too, from an economical point of view which is a very essential condition in our industry. The efficiency of the truck is the main consideration and as regards that, we are pleased to give favorable testimony.

LAKE VIEW BREWING COMPANY

Buffalo, N. Y.

White Truck Best by Comparison

We consider our White Truck superior to any of the other makes we have been using, and have found that the matter of repairs is very slight considering the amount of work the car is called upon to do.

THE FINK BREWING COMPANY

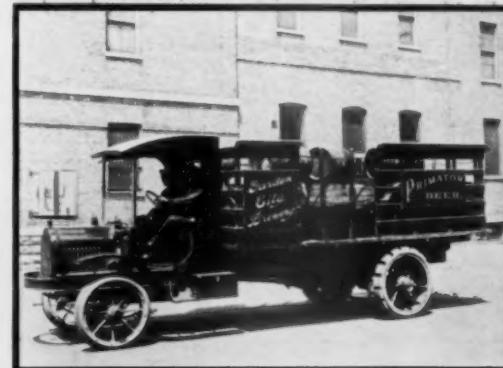
Harrisburg, Pa.



White 3-ton truck owned by the South Bend Brewing Association, South Bend, Ind.



One of the four White Trucks owned by the Calgary Brewing & Malting Company, Ltd., Calgary, Alberta



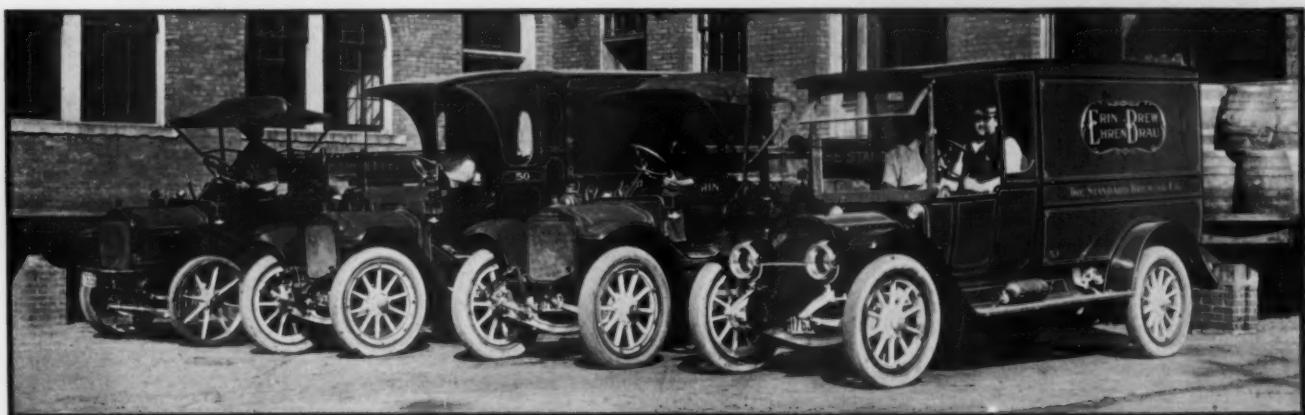
One of the two White Trucks owned by the Garden City Brewery, Chicago, Ill.



White 3-ton truck owned by the Cleveland & Sandusky Brewing Co., Cleveland, Ohio

 **THE WHITE COMPANY**

WHITE MOTOR TRUCKS



Fleet of White Trucks owned by The Standard Brewing Company, Cleveland, Ohio



White 3-ton truck owned by the Gottlieb-Bauernschmidt Straus Brewing Company, Baltimore, Md.



One of the seven White Trucks owned by the Independent Brewing Company of Pittsburgh, Pittsburgh, Pa.



One of the four White Trucks owned by the I. Leisy Brewing Company, Cleveland, Ohio

OWNERS' ENDORSEMENTS

White Service Prompt and Dependable

We are pleased to state that the White 1½-ton Delivery Truck in our service since October, 1913, has given us satisfactory service, and we do not hesitate to recommend your truck to anyone who is in need of that kind of truck.

We are also pleased to mention that your service department has responded promptly and faithfully to any calls that we have been obliged to make.

THE PILSENER BREWING COMPANY

Cleveland, Ohio.

White Trucks Serve Out-of-Town Trade

We are getting very good service out of the three five-ton White Trucks in operation at our bottling department. We carry full loads of 180 to 200 cases; the trucks being speedy, enable us to cover out-of-town trade within reasonable time.

Without trucks this trade could not be served at all. This is the greatest advantage over other methods of delivery. The goods can be delivered at the customer's place of business, where otherwise we would be compelled to ship by rail, which entails additional expense to the customer as well as to ourselves.

LION BREWERY

New York City.

White Truck Gives Entire Satisfaction

The White Truck which we are using has given entire satisfaction since it was put in service, and we consider it as good a truck as is on the market today, for the purpose we are using it.

Macon, Ga.

ACME BREWING COMPANY

White Trucks Make Long Hauls Easy

The White 5-ton and 3-ton Trucks recently purchased from The White Company are giving us entire satisfaction. We now make the long hauls, which were always a source of annoyance, without any hitch or trouble.

THE DIEBOLT BREWING COMPANY

Cleveland, Ohio.

Four Years of Continuous Service

We have a White 1½-ton Truck in service since July, 1910. Same has been in daily use since. The machine is in good condition today and can, therefore, say that it has given good satisfaction.

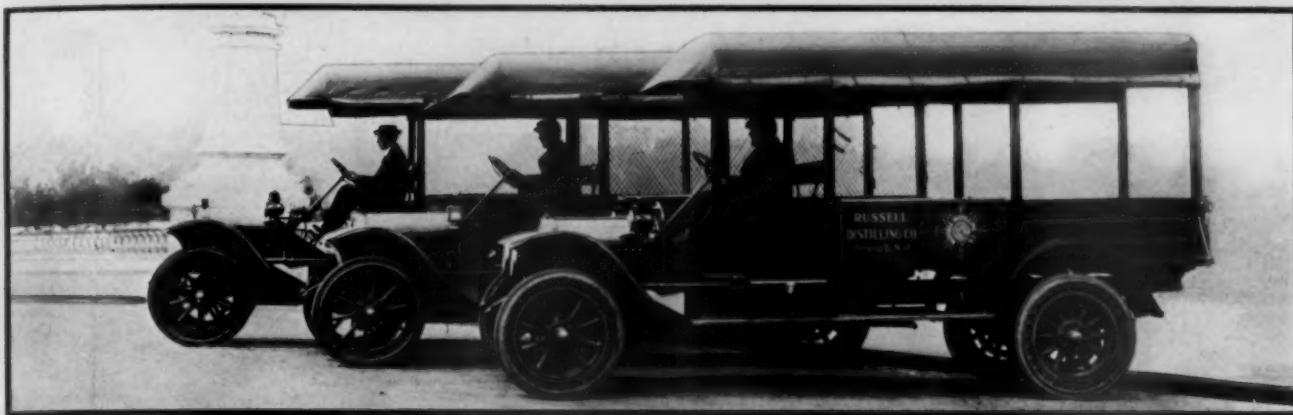
The repairs on the machine proper have been nominal, and we can recommend your trucks to any person who is in want of a good, well made truck.

PETERSEN BREWING COMPANY

Grand Rapids, Mich.

THE WHITE  COMPANY

WHITE MOTOR TRUCKS



Fleet of White Trucks owned by the Russell Distilling Company, Newark, N. J.

OWNERS' ENDORSEMENTS

Experienced User Likes White Truck

We use this truck for our beer deliveries around the city. We have four trucks in service. Have been using trucks for four years and consider the White $\frac{1}{2}$ -ton Truck equal to any we have.

H. WAGENER BREWING COMPANY

Salt Lake City, Utah.

White Meets Demand of Delivery Service

and durability.

In selecting White Trucks to cope with our rapidly increasing delivery service, we are satisfied that no better move could have been made on our part.

MORAND BROTHERS

Chicago, Ill.

Small Expense for Upkeep and Maintenance

The three White Trucks purchased of you have given us the very best of satisfaction. We have had but very little trouble in the operation of these trucks, while the cost of maintenance has been low. We also find these trucks to be economical in the use of gasoline and lubricating oil.

We have no complaint to register against the trucks and can cheerfully recommend them to the public.

EVANSVILLE BREWING ASS'N.

Three and One-Half Years of Hardest Service I can recommend the White Truck as one of the best trucks on the market.

I bought a White Truck, $1\frac{1}{2}$ -tons capacity, three and one-half years ago, and the service has been satisfactory in every way.

My truck must travel over some of the worst roads in south Jersey, and is always loaded to the full capacity, but in the whole time I have had the White Truck, there were no repair bills to amount to anything.

If anyone wants to buy a truck that will be economical and serviceable, I recommend the White Truck as being both. Especially do I recommend them for heavy hauling and long trips over rough roads such as must be done in my business.

CHRISTIAN ATZ'S BREWERY

Egg Harbor City, N. J.



White 1 1/2-ton truck owned by the Schuster Company, Cleveland, Ohio



White 1 1/2-ton truck owned by William J. Sheehan Company, New Haven, Conn.



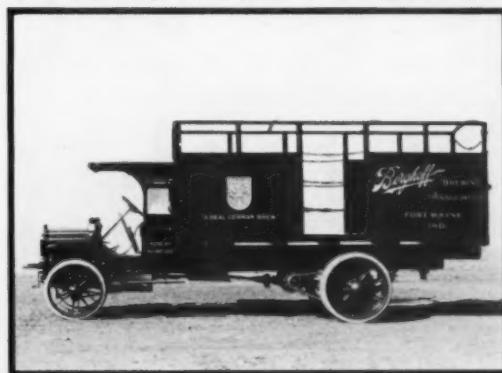
White 1 1/2-ton truck owned by Jos. Feldmann, New York City

THE WHITE COMPANY

WHITE MOTOR TRUCKS



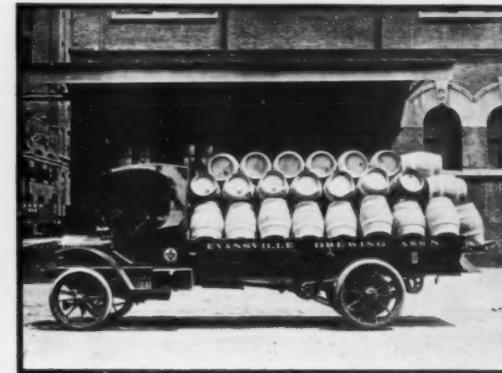
White 3-ton truck owned by the National Distilling Company, Milwaukee, Wis.



One of the three White Trucks owned by the Berghoff Brewing Association, Fort Wayne, Ind.



White 1 1/2-ton truck owned by The Stark-Tuscarawas Brewing Company, New Philadelphia, Ohio



One of the five White Trucks owned by the Evansville Brewing Association, Evansville, Ind.

The Name White Protects Your Investment

There is no uncertainty when an investment is made in White Trucks. The name White on a motor truck is a sufficient guarantee of its durability, efficiency and economy and the owner knows that throughout the life of the truck a strong, responsible manufacturer stands behind his investment.

White Trucks are built to give the greatest service for the least cost for the longest time—not to fit a cheap sale price. That there are more White Trucks in service than any other one make—and owned by the best known firms in every line of business—proves that White Trucks are a good investment.

Some of the oldest and most reputable firms are found in the Brewing and Distilling Industry and they know the importance of purchasing equipment only from manufacturers of similar standing.

Why experiment when so many firms in your line of business recommend White Trucks to you? Profit by their experience and save the time and expense of experimenting.

OWNERS' ENDORSEMENTS

White Selected After Long Experimenting

After exhaustive tests of all the different makes, together with data gained during four years of experience in operating trucks for the delivery of Draught and Bottled Beer, we came to the conclusion to adopt the "White" Truck for our standard, and, as you know, we now have a number of these trucks in use in our delivery system.

The ability of the local agents for the "White" Trucks to give after-sale service was largely instrumental in our arriving at this decision, in addition to economical fuel consumption and low maintenance, the first cost being no consideration.

LOS ANGELES BREWING COMPANY

Los Angeles, Cal.

White Truck Does the Work of Six Teams

We have had one of your White Trucks in service for about three years, and considering the roads we have in our territory, it has done wonderful work. Many days it has done the work of six teams of horses. Ours is a 3-ton truck and we never load it with less than forty barrels of beer. We are well pleased and would not have any other make.

HOWELL & KING CO.

Pittston, Pa.

White Truck is Absolutely Reliable

We take pleasure in informing you that the White Truck which we purchased from you over a year ago, has given entire satisfaction, and has been operated at a lower cost of maintenance than any truck of the same capacity which we are now using.

It is absolutely reliable and from all appearances is good for a considerable period.

We expect to be in the market for another truck within the next few months and will most certainly favor you with the order.

HONOLULU BREWING & MALTING COMPANY, Ltd.
Honolulu, T. H.

THE WHITE  COMPANY

WHITE MOTOR TRUCKS



Fleet of White Trucks owned by the Diebolt Brewing Company, Cleveland, Ohio

\$6.00 for Repairs in Two Years

We have used a $\frac{3}{4}$ -ton White Truck for our bottled beer deliveries for the past two years. During this time we have made 8500 miles. Our repair bill, excepting tires, amounted to \$6.00. All parts of the truck are in A-1 condition at this writing.

From our experience we feel that the White Truck is as good as any on the market.

IDAHO BREWING & MALTING CO.

Boise, Idaho.

White Service Adds Value to White Trucks

We are pleased to be able to say that the White Trucks we are operating are giving us complete satisfaction.

The 3-ton truck which we are operating was the first one purchased and has given us two years of perfect service.

The upkeep of these trucks has been low in comparison with other trucks we are and have been operating, so that we feel qualified to give the White Trucks a boost in the face of this comparative operation.

As to service, we could not get better attention if the factory were the next store to us.

THE ARNHOLT & SCHAEFER BREWING CO.
Philadelphia, Pa.

Truck Increases Output —Cuts Expense

It affords us great pleasure to inform you that the White Truck which we purchased last year, has proved itself a most efficient and serviceable machine, and we are more than pleased to state that we have not as yet required one cent for repairs, nor have we experienced the slightest motor trouble.

This truck has displaced four horses, and incidentally increased our net output about ten per cent.

HERMAN TEWES' SONS

College Point, Long Island.

White Truck Expedites Delivery

We have been using a White Truck for the past year, which has been in operation daily, carrying a 3-ton capacity to say

the least.

We have the most favorable comments to offer, and consider the White Truck far superior to teams in that it expedites delivery.

THE CLEVELAND & SANDUSKY BREWING CO.
Cleveland, Ohio.



One of the three White Trucks owned by the Lion Brewery, New York City



White 3-ton truck owned by The Forest City Brewing Company Cleveland, Ohio



White 3-ton truck owned by the Buckhardt Brewing Company Roxbury, Mass.

THE WHITE  COMPANY

WHITE MOTOR TRUCKS



White 1/2-ton truck owned by The Pilsener Brewing Co., Cleveland, Ohio



One of the two White Trucks owned by the Bakersfield Brewing Company, Bakersfield, Cal.



One of the six White Trucks owned by The P. Schoenhofen Brewing Company, Cleveland, Ohio



White 5-ton truck owned by E. & J. Burke, Ltd., New York City

Some of the Brewing and Distilling Companies and Liquor Dealers Who Own White Trucks

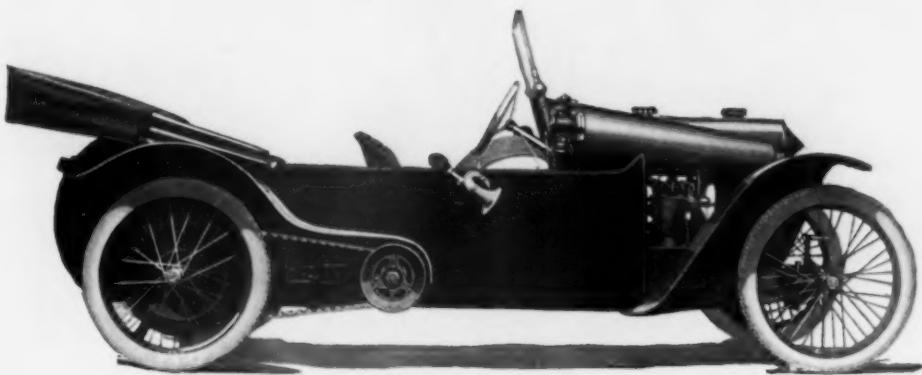
July, 1914

Acme Brewing Company	Macon, Ga.
Aetna Liquor Company	Tacoma, Wash.
The Akron Brewing Co.	Akron, Ohio
American Wine Company	St. Louis Mo.
The Arnolt & Schaefer Brewing Company	Egg Harbor, N. J.
Christian Atz	Bakersfield, Cal.
Bakersfield Brewing Company	Chicago, Ill.
Berghoff Brewing Association	Portland, Ore.
Blumauer & Hoch	Columbus, Ohio
Bott & Cannon Company	New York City
E. & J. Burke, Ltd.	Roxbury, Mass.
Burkhardt Brewing Company	Akron, Ohio
The M. Burkhardt Brewing Company	Calgary, Alta.
Calgary Brewing & Malting Company, Ltd.	Bakersfield, Cal.
F. M. Clark	Cleveland, Ohio
The Cleveland & Sandusky Brewing Company	Tacoma, Wash.
Columbia Brewing Company	Boston, Mass.
Commercial Brewing Company	Meriden, Conn.
Connecticut Breweries Co.	Youngstown, Ohio
Cox & Higgins	Taunton, Mass.
Philip Curran & Company	Davenport, Ia.
Davenport Brewing Company	Cleveland, Ohio
The Diebold Brewing Company	Stamford, Conn.
Leo Donatelli	Spokane, Wash.
Durkin Liquor Company	Evanston, Ind.
Evansville Brewing Association	Danville, Ill.
Fecker Brewing Company	New York City
Joseph Feldmann	Harrisburg, Pa.
The Fink Brewing Company	Worcester, Mass.
M. J. Finnegan & Co.	Newark, N. J.
Fleckenheimer Bros., Inc.	Cleveland, Ohio
The Forest City Brewing Co.	Hoboken, N. J.
Louis Fricke	Chicago, Ill.
Garden City Brewing Company	Kansas City, Mo.
Glasner & Barzen Distilling & Importing Company	Baltimore, Md.
Gottlob-Baumerschmidt-Straus Brewing Company	Bakersfield, Cal.
Fred Gunther Company	Oakland, Cal.
E. J. Hanjes, Jr.	Green Bay, Wis.
Hochgreve Brewing Company	Lawrence, Mass.
Holihan Brothers	Honolulu, Hawaii
Honolulu Brewing & Malting Company, Ltd.	Pittston, Pa.
Howell & King Company	Charlestown, Mass.
E. M. Huestis & Company	Boise, Idaho
Idaho Brewing & Malting Company	Pittsburgh, Pa.
Independent Brewing Company of Pittsburgh	San Bernardino, Cal.
Ingersoll & Easler Company	Milwaukee, Wis.
Jung Brewing Company	Waterloo, Ont., Toronto, Ont.
Kunz Brewing Company, Ltd.	Honolulu, Hawaii
S. Kurian	Buffalo, N. Y.
Lake View Brewing Company	Cleveland, Ohio
I. Leisy Brewing Company	New York City
Lion Brewery	Los Angeles, Cal.
Los Angeles Brewing Company	Pasadena, Calif.
Maier Brewing Company	Los Angeles, Calif.
J. M. Medeiros	Paia, Maui
George J. Meyer Malting Company	Buffalo, N. Y.
Morand Bros., Inc.	Chicago, Ill.
Edward Muesel	South Bend, Ind.
National Distilling Company	Milwaukee, Wis.
A. T. Newman & Brother	Portage La Prairie, Man.
Louis Nicholas	Schenectady, N. Y.
D. Osborn & Company	Newark, N. J.
Fabst Brewing Company	Cleveland, Ohio
Pacific Brewing & Malting Company	Tacoma, Wash.
Peterson Brewing Company	Grand Rapids, Mich.
The Pilsener Brewing Company	Cleveland, Ohio
E. Porter Brewing Company	Joliet, Ill.
J. B. Regan Importation Company	New York City
George J. Renner Brewing Co.	Akron, Ohio
Paul Ritter Sons	Cumberland, Md.
Rock Island Brewing Company	Rock Island, Ill.
Russell Distilling Company	Newark, N. J.
Schober Ice & Brewing Company	San Antonio, Texas
The Peter Schoenhofen Brewing Company	Ill., Cleveland, Ohio
The Schuster Company	Cleveland, Ohio
Seattle Brewing & Malting Company	Seattle, Wash.
Conrad Seipp Brewing Co.	Chicago, Ill.
William J. Sheehan Company	New Haven, Conn.
South Bend Brewing Association	South Bend, Ind.
The Standard Brewing Company	Cleveland, Ohio
The Stark-Tuscarawas Brewing Company	Philadelphia, Ohio
Steinhart & Bros., Company	New York City
The Steubenville Brewing Company	Steubenville, Ohio
The Five Sullivan Brothers	Providence, R. I.
Edward Trainer	Philadelphia, Pa.
The Henry Wagner Brewing Company	Salt Lake City, Utah
Western Commercial Company, Ltd.	Calgary, Alta.
J. F. Wiesner & Sons Brewing Company	Baltimore, Md.
Williams & Rowland	Tacoma, Wash.
Worcester Brewing Corporation	Worcester, Mass.

THE WHITE COMPANY
CLEVELAND

BOTH IN QUANTITY AND VALUE OF PRODUCTION, THE LARGEST MANUFACTURERS
OF COMMERCIAL MOTOR VEHICLES IN AMERICA

"BOWER SAVES POWER"



In the Lightest Pleasure Vehicles
"Bower Saves Power"
In the Heaviest Commercial Cars

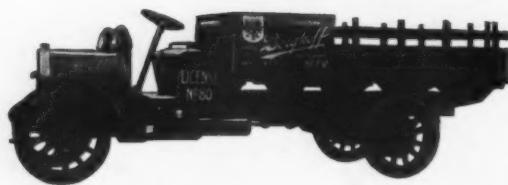


Notice: *The Bower Roller Bearing is patented in the United States and foreign countries. INFRINGERS of our patent right to MAKE, VEND or SELL will be duly prosecuted.*

BOWER ROLLER BEARING COMPANY
Detroit, Michigan

When Writing, Please Say—"Saw Your Ad. in the C C J"

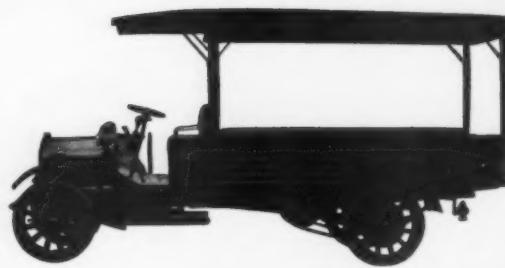
Standard Highland Bodies For Motor Trucks



Our production facilities are so ample and complete that you can not only procure the most desirable body in the quickest time and at the lowest cost, but the wide range of types enables the car builder to procure from this line the right body for every business. We make 38 sizes of Flare Board and 27 sizes of Stake Bodies in addition to Furniture and various other types of bodies.

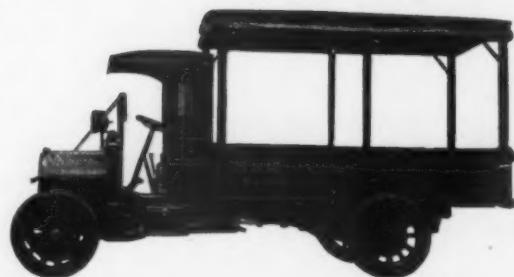
We have full line of standardized Panel and Express Bodies for 1,000 pound and 1,500 pound Delivery Cars

For Economy, Service
and Durability, Get
Highland Bodies



Highland Bodies are standard for motor trucks because they have proved to be the best from the stand-points of efficiency and durability; because they are made, not by wagon builders, but by engineers who know the severe service motor truck bodies must withstand and design accord-

and design accordingly; because by standardization we have not only made better bodies, but reduced the cost below those distinctly inferior; because they have proved superior from every practical standpoint.



Our Catalogue and Price List Should Be With You Always

When Writing, Please Say—"Saw Your Ad. in the C C J"